FEBRUARY

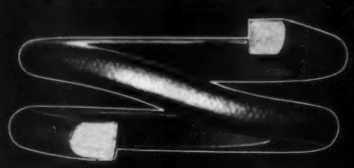
Railway Engineering and Maintenance

Reliance HY-CROME Spring Washers

The quality of a FINISHED PRODUCT is determined by the grade and finish of the RAW MATERIAL used in its manufacture. Our own cold drawn steel plant No. 2 with its modern equipment scientifically operated by experienced personnel guarantees us the highest type of alloy steel and a complete control of delivery. Railroads recognizing these facts have shown their preference for *HY-CROME Spring Washers.*

Standard HY-CROME

Hy-Reaction HY-CROME

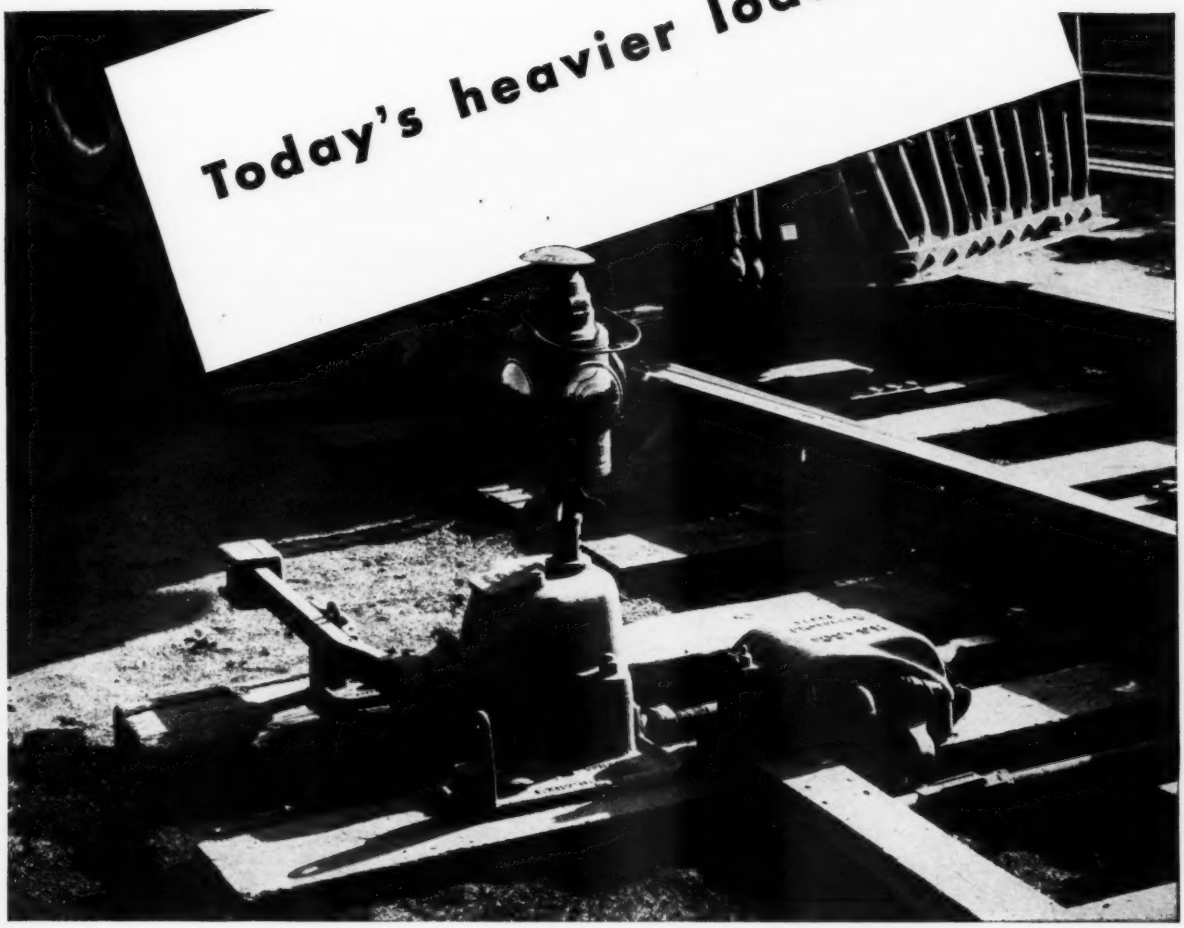


Thackeray HY-CROME

Locomotive HY-CROME

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, O.

Sales Offices New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal



demand sturdy equipment

BETHLEHEM MODEL 53 SWITCH STAND

TRACK and track equipment have to carry extra heavy loads these days—have to be sturdier, more dependable in every way. Nowhere is this truer than at points such as turnouts, where moving parts must function smoothly, continuously under constant punishment. Take switch stands for example. Here Bethlehem is ready to help you with a really rugged switch stand, the Bethlehem Model 53.

Only three moving parts—throwing lever, sturdy forged spindle and heat-treated alloy sliding block—make the Bethlehem Model 53 Switch Stand easy to install and service, simple and positive to operate. Its all-around ruggedness and dependability make it the ideal stand for main-line service. All moving parts are fully enclosed, with provision for automatic lubrication if desired. Bethlehem Model 53 Switch Stand is available in low and intermediate models, designated 53-A and 53-B. For information, write Bethlehem Steel Company, Bethlehem, Pa., for Booklet 149A.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

WOODINGS-VERONA TOOL WORKS

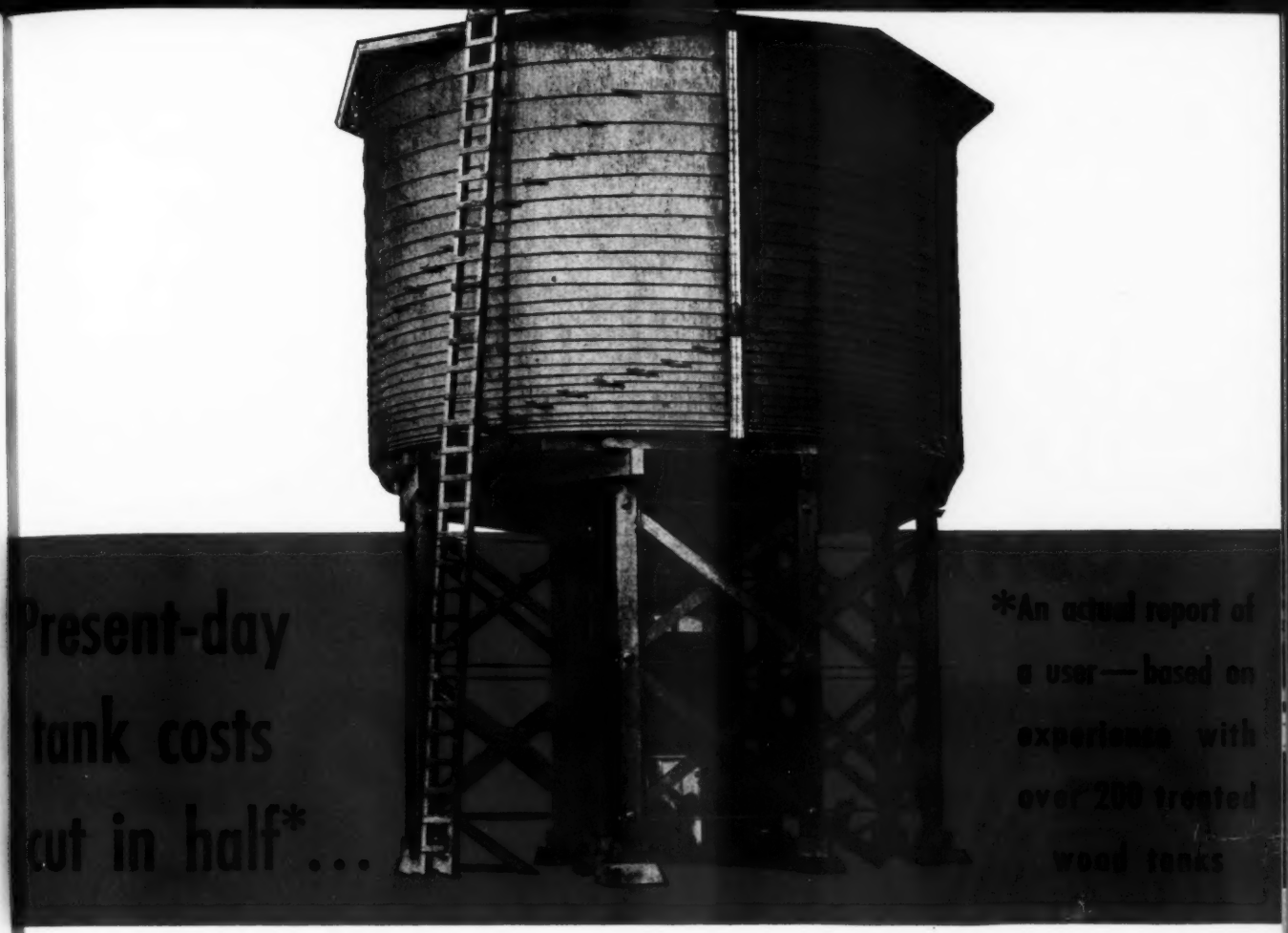
VERONA, PA.

Since 1873

WE ARE NOW AT WAR. Our First Aim, of Course, Will Be To Do All Those Things Necessary To Help in Our Fight For Victory. We Are Not Sure Yet Whether the Procedure Under Which We Have Been Operating During the Last Fourteen Months Will Continue. OUR GOVERNMENT WILL MAKE THAT DECISION. We Do Believe Our Old Customers Will Rank High in Our Defense Efforts and That We Can Still Continue To Serve Them.

WOODINGS FORGE *and* TOOL COMPANY

VERONA, PA



. . . with Pressure-creosoted material

If delivery of materials is hampering your construction program, let pressure-treated wood release the brakes for you. Railroads everywhere are successfully using it, not as a temporary expedient but as a first-choice, based on its proven strength, durability, ease of fabrication, low first cost and maintenance-free service.

To cite one example: a superintendent of water service reports that he is building pressure-treated tanks today at less than half the cost of other permanent construction.

On the basis of his experience with 240 wood tanks, he estimates average life at 50 years. Further substantial savings are effected, because painting is not required for protection against corrosion or deterioration.

We will be glad to give you details on the application of pressure-treated wood in cars, bridges, buildings, wharves and piers, or other installations.

WOOD PRESERVING DIVISION
KOPPERS COMPANY
PITTSBURGH • PENNSYLVANIA

use **K O P P E R S** *products*

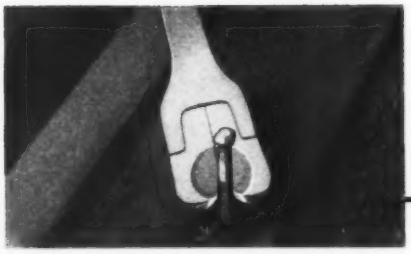
Send this coupon for free literature from the Koppers Library of Technical Information.

- ☐ "Pressure-treated Timber"
- ☐ "Pressure-treated Timber in Railroad Cars"
- ☐ "Locomotive Cylinder Packing"
- ☐ "Locomotive Valve Packing"
- ☐ "Roofing Specifications"
- ☐ "Waterproofing Specifications"
- ☐ "Tar-base Paints"
- ☐ Send me complete list of technical literature

KOPPERS COMPANY
7035 Koppers Building Pittsburgh, Pa.

NAME .....
TITLE .....
COMPANY .....
ADDRESS .....

HARD-TO-GET SPIKES COME OUT QUICKLY WITH FLEX-TOE CLAW BARS . . .



Boat spikes come out without driving or shimming. The toes grab hold on the body of the spikes.

The toes of Flex-Toe claw bars get under the heads of spikes at guard rails and take tight hold—no shimming, blocking, nor driving.

In tight spots Flex-Toe grabs any piece of protruding metal. A series of lifts removes spikes without driving.

The Flex-Toe has definitely proved its value as a general purpose claw bar. Without spike maul driving or helpers, workmen quickly pull the ordinary as well as headless, brine-eaten, and boat spikes plus drift bolts. Spikes in tough locations also come out without the usual fuss. There's no shimming at rail joints. There's nothing new to learn. Flex-Toe is thrown on spikes in the usual way . . . the alloy steel toes grab hold tightly and automatically as leverage is applied to the handle. With Flex-Toe bars your safety records will improve . . . your spike pulling speed will increase. Write today for prices and literature.

WARREN TOOL CORPORATION • WARREN, OHIO

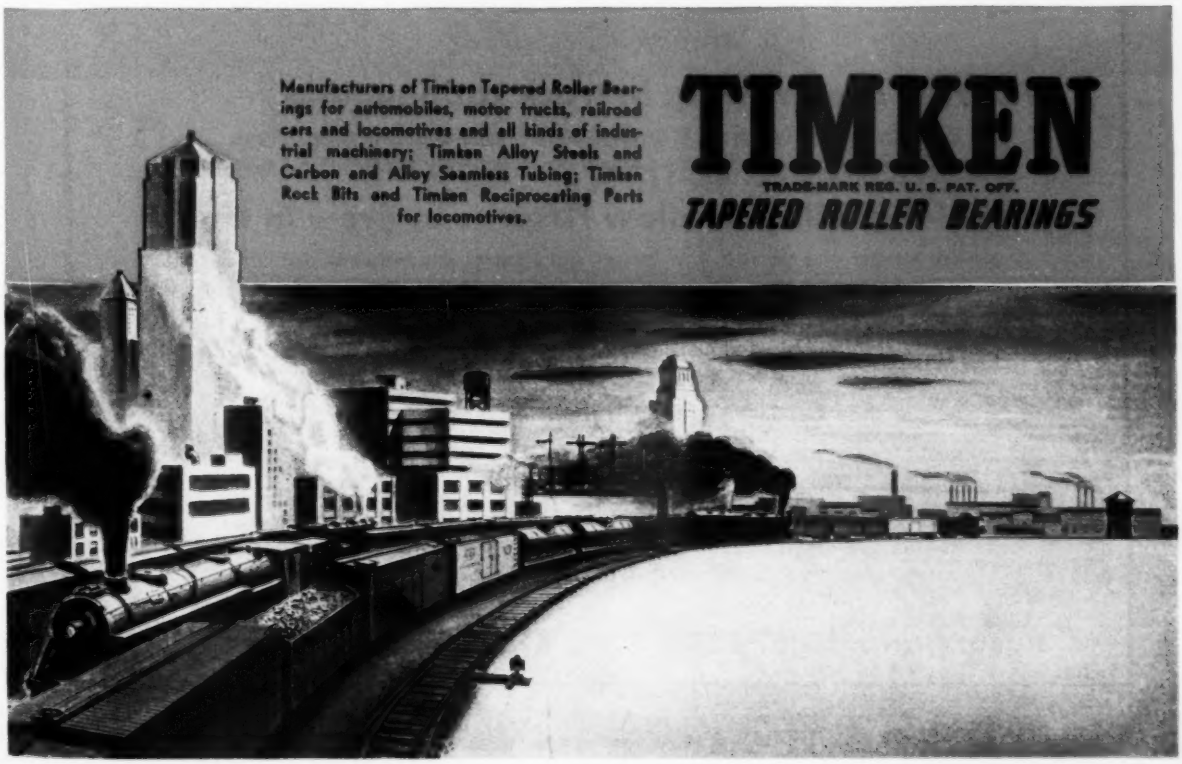
VICTORY ON THE RAILS

Maintenance equipment using Timken Bearings is helping trackage stand the strain of war transportation. It likewise will be equal to post-victory demands—be what they may.

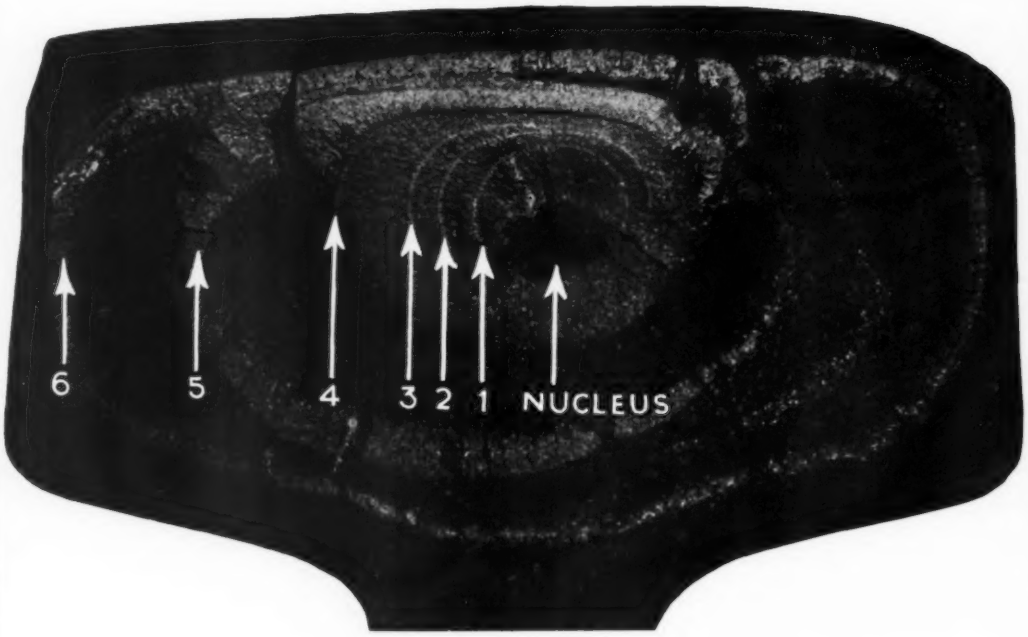
The terrific load of war time traffic being carried by the railroads is exacting a heavy toll from trackage and equipment. A good job of maintenance is being done under difficult conditions. Whether existing equipment will be equal to future maintenance requirements is a matter maintenance men should be considering now.

You can be sure of one thing; the use of a maximum number of Timken Bearings in section motor cars, trailers and other kinds of equipment will make them faster, more economical and more enduring.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO


Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits and Timken Reciprocating Parts for locomotives.
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

More Frequent Rail Testing
for
GREATER SAFETY
is the trend



Fissures are growing in track continuously

Growth Rings (numbers 1 to 6 in above photo) show progressive stages of Transverse Fissure growth which actually occurred in track.

How long will you allow Fissures to grow in track?

—the longer the period, the larger the fissure, the weaker the rail.

How frequently should you test?

Many railroads are now testing 2 or more times annually, in order to detect fissures while "small" (in early stages of growth)—before they become larger and the rail weaker.

The purpose of rail testing is to make track safe by removing the maximum number of defects while "small"—less subject to failure in service. Therefore, maximum safety is obtained by that testing frequency which results in the highest percentage of "small" fissures detected. **Send for S. Data Sheet 713-A.**

HOBOKEN, N. J. **SPERRY RAIL SERVICE** **CHICAGO, ILL.**

★Every railroad man concerned with the building of structures of any type should read this new book!

SEND FOR YOUR FREE COPY and learn how successfully mass-production methods are being applied to building construction in every section of the United States. This photograph of part of the National Homes Corp. plant at Lafayette, Ind., shows a typical production line which any railroad can easily adapt to its needs.

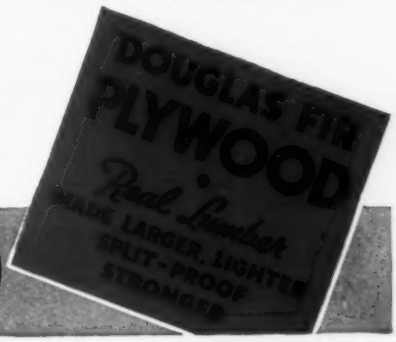
Prefabrication WITH PLYWOOD

has been proved practical by the nation's leading prefabricators!

● Prefabrication with Plywood has these advantages over conventional construction: 1. Shop work can be systematized. It is much faster than field work, and no time is lost on account of bad weather. 2. Greater speed minimizes overhead. 3. Greater accuracy and control are obtained. Glued construction, far superior to nailing, is made possible. 4. Foundations are built while walls are assembled. Field erection is accomplished in much less time.

Every month more than 1000 buildings, in which Douglas Fir Plywood serves as a basic structural material, are leaving the factories of the nation's leading prefabricators. Doesn't this prove that prefabrication has come of age? That it can be adapted to serve every building need? That Douglas Fir Plywood is the most satisfactory material for prefabricated structures because of its light weight, its amazing strength, its large size, its kick-proofness?

The free book, *"How to Build Houses Fast,"* describes prefabrication with plywood in detail and contains photographs of the operations and structures of prefabricators from coast to coast. Write for your copy now. Douglas Fir Plywood Association, Tacoma Building, Tacoma, Wash.



GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D.F.P.A.

"I COST VERY LITTLE - BUT I HELP SOLVE YOUR WARTIME PROBLEMS OF LABOR AND VITAL MATERIALS SHORTAGES"
RMC PLASTIC JOINT LUBRICANT
RAILWAY MAINTENANCE CORPORATION
"I INCREASE RAIL LIFE"
"I PERMANENTLY PREVENT CORROSION AND PROVIDE PROPER LUBRICATION"
"I REDUCE RAIL JOINT MAINTENANCE"

R.M.C. PLASTIC

One, Low Cost Application Does The Trick

Joint Parts 100% corrosion-free years after packing with R. M. C. Plastic

With Wartime conditions creating serious shortages of labor and steel, the use of R. M. C. Plastic to protect rail joints becomes increasingly important.

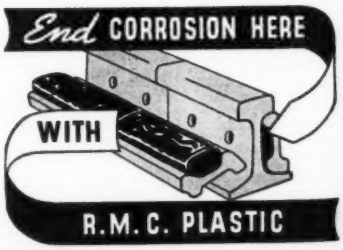
For one application keeps rail joints thoroughly lubricated and free from corrosion *for the life of the rail.*

And lubricated, corrosion-free joints do not "freeze" and cause kinked or humped track.

Nor are wide openings between rail ends . . . the cause of excessive rail end batter . . . so apt to occur at joints that are free to expand and contract.

With all these benefits, R. M. C. Plastic is inexpensive. Specify its immediate use.

Molded blocks of R. M. C. Plastic are placed on the inner faces of the joint bars before they are bolted to the rail, the bolting action solidly packing the plastic into every section of the joint assembly.



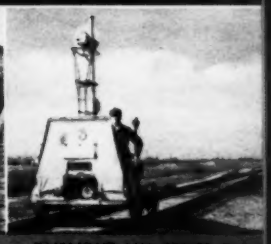
RAILWAY MAINTENANCE CORP.
PITTSBURGH PENNSYLVANIA

FAIRMONT M9 SERIES D, 1 to 2 man inspection car

FAIRMONT M14 SERIES E for all light section service

FAIRMONT S2 SERIES E in standard section work

FAIRMONT S9 SERIES D car in signal maintenance work


FAIRMONT M19 SERIES D in track supervisor's service

"SPEED and more Speed!"—the demand for still faster delivery of copper, cotton, wool, steel, aluminum and other materials needed for defense production, has found American railroads well prepared. Anticipating the new requirements, they have added improved, new, fast-freight schedules and have increased their facilities for maintaining fast deliveries. Cars that carry no freight play a vital part in this latter service. These are the cars upon which the track supervisors, inspectors, signalmen and section men ride—the cars that carry the tools and supplies with which rails, ties and roadbed are kept in top-notch condition. In this branch of railroading, Fairmont cars have been outstanding for their dependability and economy for 31 years. There is a Fairmont car for every hauling requirement. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

One to Eight Men. 1800 Lb. Load Capacity

Fairmont

RAILWAY MOTOR CARS

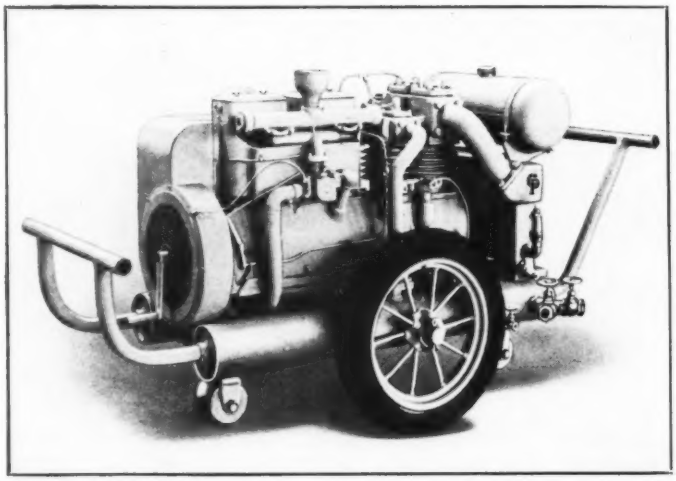
Performance ON THE JOB COUNTS

OF ALL THE CARS IN SERVICE TODAY

MORE THAN HALF ARE FAIRMONTS

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

"PATROL" COMPRESSOR COMPLETELY AIR-COOLED



↑WHEN AIR SUPPLY exceeds demand, unloading inlet valves are automatically held open. An automatic throttle slows the engine to idling speed during these unloading periods and speeds it up again just prior to reloading.

NO RADIATOR OR WATER SYSTEM TO LEAK OR FREEZE

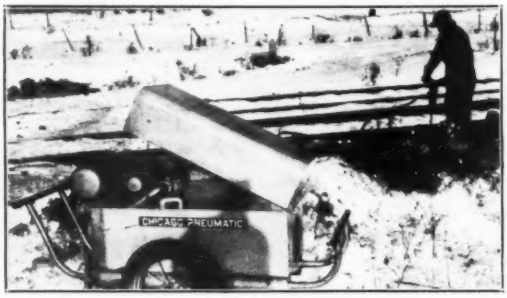
Built for Year-Round Operation

NEW YORK — Latest aid to more efficient maintenance-of-way is the Chicago Pneumatic "Patrol" Tamper Compressor, an all-weather unit for spot tamping and other track or bridge repairs. Both the gasoline engine and the two-stage compressor are completely air-cooled, eliminating danger of freezing. The four-cylinder Wisconsin gasoline engine has 50% more power than the "Patrol Tamper Compressor requires, a liberal reserve which permits satisfactory operation even at high altitudes.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

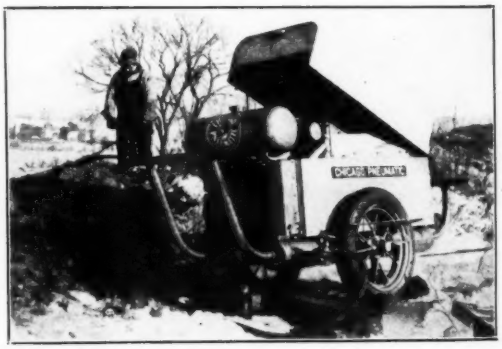
60 CUBIC FEET→ of free air per minute at 100 pounds pressure is the actual capacity of the CP "Patrol" Compressor. It will operate four CP-3D Tie Tampers or two CP-116 or CP-117 Cut-Spike Drivers or an alternate number of other pneumatic tools.



TOOLS THE "PATROL" WILL OPERATE

CUT-SPIKE DRIVERS • WOODBORERS
WRENCHES • SINGLE PISTON SCALERS
BOYER RIVETING HAMMERS • METAL DRILLS
GRINDERS • TRIPLE PISTON SCALERS
BOYER RIVET BUSTERS • SINKER DRILLS
RAIL DRILLS • BABY SUPERIOR SCALERS
BACKFILL TAMPERS • CONCRETE SURFACERS
SCREW-SPIKE DRIVERS • PAVING BREAKERS
BONDING DRILLS • WIREBRUSH MACHINES
BLOW GUNS, PAINT SPRAY or SAND BLAST NOZZLES

↑AIR SUPPLY for track maintenance need not wait for weather. The air-cooled "CP Patrol" is ideal for year-round operation; no radiator to leak or freeze; no water pump and no fan belts.



↑TWO-STAGE COMPRESSION, with almost perfect intercooling, and the large area of the famous CP Simplate Valves afford high efficiency and low temperatures, minimized carbonization of valves and deterioration of air hose.

CHICAGO PNEUMATIC

AIR COMPRESSORS

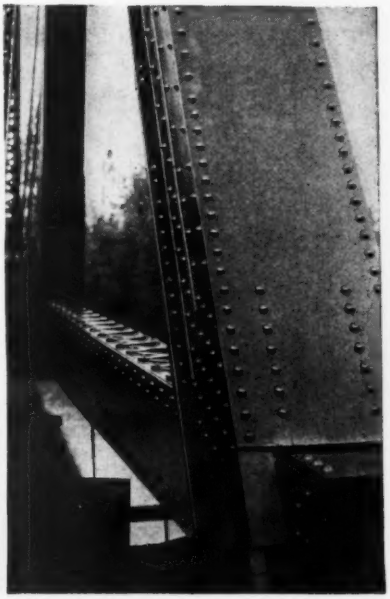
ALSO: Pneumatic Tools, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

PORTABLE
STATIONARY
AIR OR GAS
MOTOR DRIVEN
STEAM DRIVEN
DIESEL ENGINE
DRIVEN

STOP – BEFORE REPAINTING
LOOK – AT THIS CLEANING PROCESS
LISTEN – TO THE RESULTS

Flaking paint, bare steel surfaces exposed to the elements—this bridge section needs paint.

For a better, longer-lasting paint job, remove loosened paint, rust and scale by Airco Flame Cleaning before repainting.



Completely cleaned and dehydrated, the surface is repainted while still warm. The clean, smooth-surfaced paint will last longer.

The world's best paint can't be expected to last long when applied to rusty, scaly steel. That's why so many maintenance men prepare metal surfaces by Airco Flame Cleaning before they repaint. This flexible process removes rust and scale, and dehydrates as it cleans, thus providing a warm, dry surface conducive to a lasting paint job. It is the most effective method yet devised to prepare metal surfaces, new and old, for painting and repainting. Ultimate maintenance costs are lower.

Airco Flame Cleaning is a speedy, economical process. It's the same process which increased the paint life on California's Golden Gate Bridge by more than 400%. The apparatus for applying it is standard, portable, easy to operate. If you have a metal painting problem, this Airco process may be your solution.

The members of Airco's railroad department will gladly give further information on request. Ask any Airco office for details.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.
AIRCO DISTRICT OFFICES IN PRINCIPAL CITIES

AIRCO

WILSON

SERVING RAILROADS FROM COAST TO COAST

TO RAILWAY SUPPLY MANUFACTURERS

"They Need Us Now"

"Boss, it looks as if we're going to be out of luck this year," said the star railway salesman to his railway sales manager.

"Out of luck, Bill! What do you mean?" replied the sales manager.

"What good are orders if you can't get materials?"

"Who said we can't get materials?"

"We aren't getting them, are we?"

"Not all we need at the moment, Bill—but we're getting some—and we're going to get more."

"Do you think so?"

"Certainly—we want them for the railroads, don't we?"

"That's right, Boss. But what of it?"

"Just this. The railroads are just as necessary in a war as troops and guns. What good are either if you can't haul them where you need them."

"That's right. And they're doing a marvelous job too. Why the papers said a few days ago that more than 600,000 troops have been moved about the country, most of them for long distances, since Pearl Harbor."

"That's a marvelous record of service rendered by the railways, Bill. Can't you see how vital service like that is to our nation in a time of war."

"Certainly I can, Boss. But what's that got to do with *our* business?"

"It's got everything to do, Bill. Don't you realize that we're not making candy bars or women's girdles; we're making materials the railways need to make good the wear and tear of this heavy traffic. The people who're distributing the materials aren't going to let the railways go to pieces."

"You mean that they've got to keep their properties in repair if they're going to be able to meet these demands."

"That's it, Bill. And we've got to help them. They need us now—more than ever before."

"I see your point. You've certainly got a head on you. And, Boss, we ought to show them how they can get the most service from our goods too."

"That's part of our job, Bill. We're selling service now."

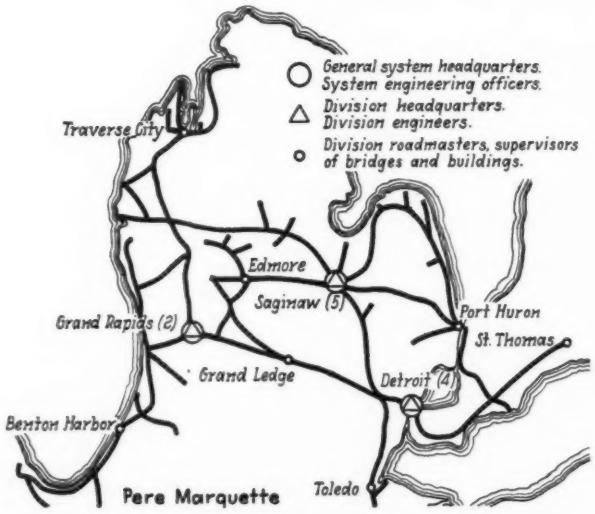
"Fine. And we're going to need help."

"In advertising?"

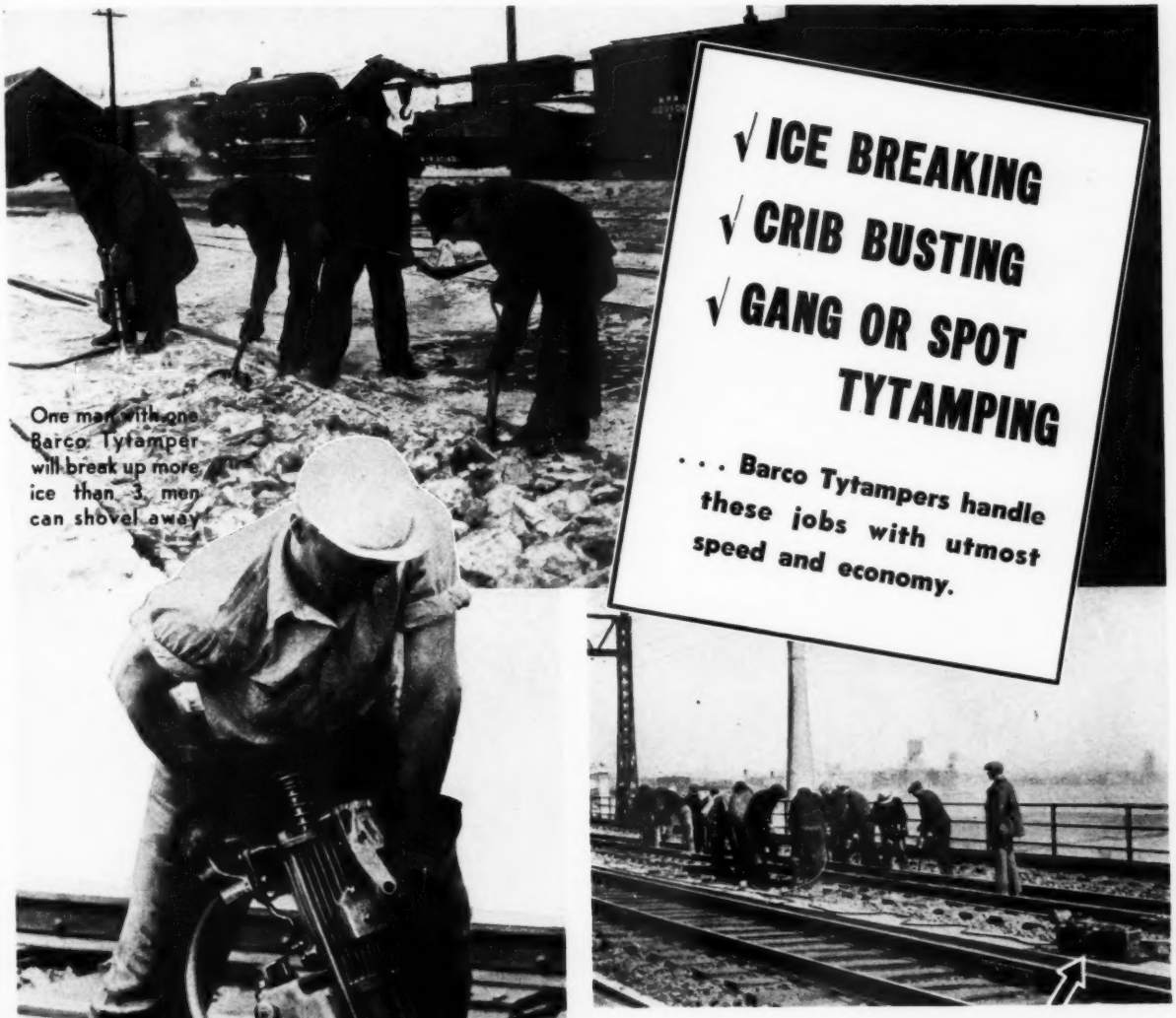
"That's what I mean. In *Railway Engineering and Maintenance*. It'll carry our story to the men at the out-of-the-way points whom I can't reach without losing a lot of time—and it'll reach the men I miss at headquarters when I call. It'll chink the holes in my selling, for it reaches all these men every month."

"I'd already thought of that, Bill. I've arranged to increase our space this year in order to tell all of our railway friends how we can help them render the service our country demands."

Railway Engineering and Maintenance Goes Every Month to the **Chief Engineer,** to the **Engineer of Bridges and Structures,** to the **4 Division Engineers** and to **Three Other Subordinate Maintenance Officers** Who Are in Training for Promotion to Supervisory Positions on the Pere Marquette.



RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS



One man with one Barco Tytamper will break up more ice than 3 men can shovel away

√ ICE BREAKING
√ CRIB BUSTING
√ GANG OR SPOT TYTAMPING

. . . Barco Tytampers handle these jobs with utmost speed and economy.

BARCO GANG TAMPING

12 Barco Tytampers operating from a small, compact, off-the-track and out-of-the-way power plant costing less than $100.00.

SIX YEARS
Satisfactory Service
Now Used By
82
Railroads

BARCO SPOT TAMPING
Each Unit Self-Powered.
No Auxiliary Equipment Required.

BARCO

BARCO MFG. COMPANY

NOT INCORPORATED
1805 W. Winnemac Ave. Chicago, Illinois

IN CANADA
THE HOLDEN COMPANY LTD.
Montreal — Moncton — Toronto — Winnipeg — Vancouver

++++++++++++++++++++++++++++++

Why your Red Cross Urgently needs

FIFTY MILLION DOLLARS, NOW

How the fund is allocated . . . What it does in service

Every dollar that you give now to your Red Cross marches into the thick of things where humanitarian help is needed most—up to the fronts and battle stations where the fighting is heaviest. Into the Red Cross hospitals and First Aid units where prompt medical attention and supplies may save innumerable lives. And throughout our broad land to train and equip volunteers to meet any emergency that may strike.

How the $50,000,000 War Fund Is Used

SERVICE TO THE ARMED FORCES $25,000,000

Provides for the care, welfare and morale of the Army and Navy, including services to men in hospitals and during convalescence. • Provides an important link between the service men and their families; keeps the families from breaking up, supplies food, shelter, medicine, and even jobs where necessary. • Provides essential medical and other supplies outside of standard Government equipment. • Operates Red Cross headquarters at camps and naval stations. • Enrolls blood donors and medical technologists for Army and Navy needs. • Provides millions of surgical dressings, sweaters, socks, etc., through volunteer workers.

DISASTER AND CIVILIAN EMERGENCY RELIEF . $10,000,000

Supplies emergency needs for food, clothing, shelter and medical attention for disaster victims. • Assists stricken families in repair of homes and other adjustments; provides minimum reserves of essential relief supplies to prevent unnecessary delays.

CIVILIAN DEFENSE SERVICES . . . . . $ 5,000,000

Trains volunteers for home nursing and nurses' aides. • Trains nurses, men and women, for active duty with the Army and Navy. • Trains volunteers in First Aid and accident prevention. • Trains volunteers for work in Motor Corps, Canteen and Production. • Instructs men, women and children in preparedness against explosive and incendiary bombs. • Organizes for evacuation of children and their families from stricken areas. • Assists Red Cross Chapters in establishing effective coordination of emergency relief with local and State defense authorities.

SERVICE AND ASSISTANCE THROUGH CHAPTERS. $ 4,000,000

Gives assistance and service to the 3,740 Red Cross Chapters with their 6,131 Branches responsible for local Red Cross activities, particularly welfare work among the service men and their families.

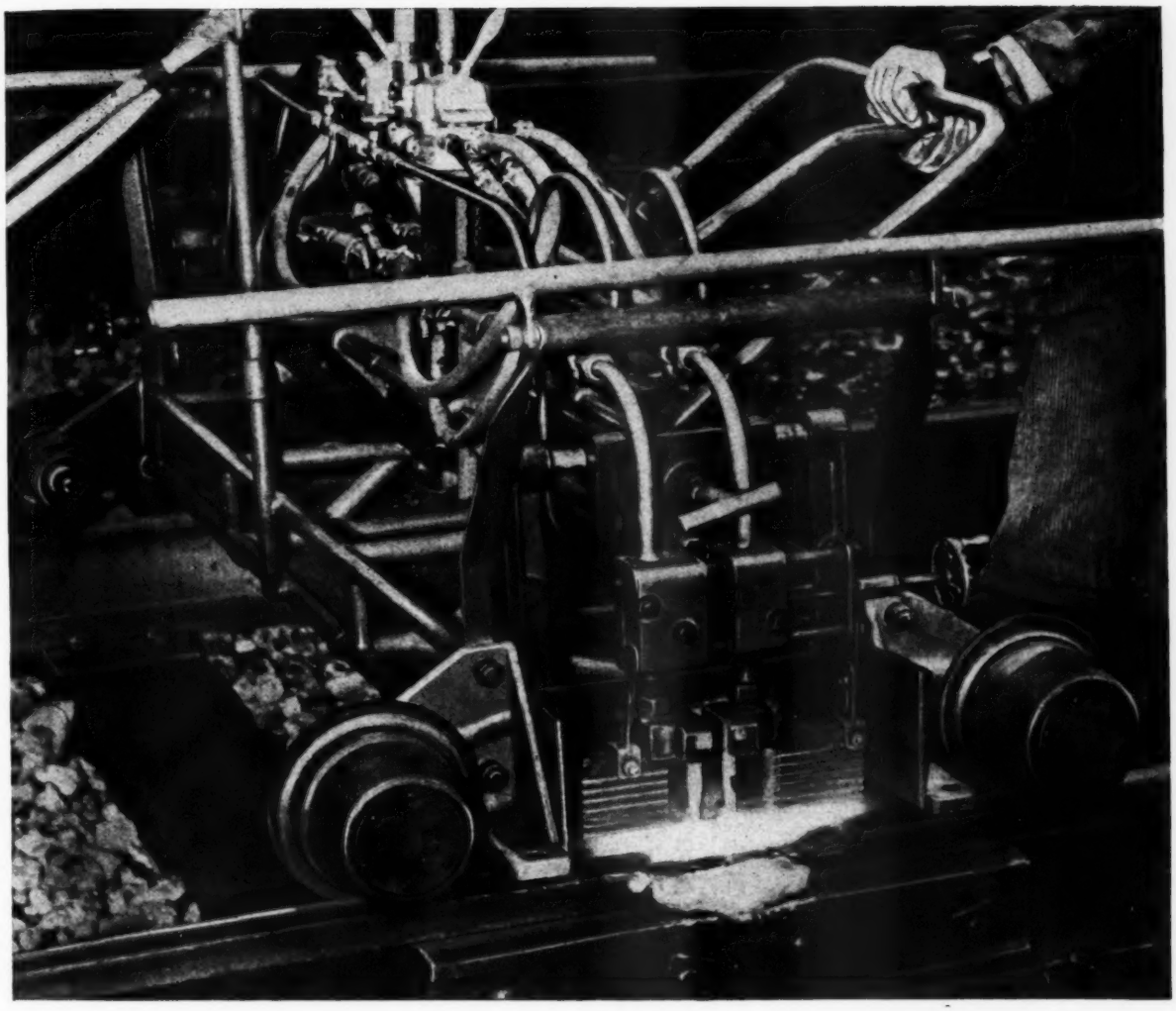
OTHER ACTIVITIES AND CONTINGENCIES . . . $ 6,000,000

Provides for unforeseen expansions in program and for new activities made necessary by unexpected developments.

TOTAL $50,000,000

THE AMERICAN RED CROSS $50,000,000 WAR FUND

Note to Red Cross Canvassers: The above material can be used to better inform contributors how their donations are being expended.



OXY-ACETYLENE END-HARDENING
Produces A Batter-Resistant Rail-End

• Rail ends hardened by the Oxweld method are uniformly within the hardness range established as most effective for resisting batter. When applied to new rail in track this procedure makes possible substantial savings in joint maintenance. The Oxweld rail end-hardening method, including the equipment used to apply it, is kept up-to-date and efficient by Oxweld engineers. This service is one of many which Oxweld has made available to the railroads to help achieve efficiency and economy in oxy-acetylene operations.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation.

No. 158 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: At War

February 1, 1942

Dear Reader:

We are now at war. The unprovoked attack on our forces at Pearl Harbor changed the thinking and objectives of our people over night. We are now united in making effective those measures that will contribute most largely to its successful conclusion.

No industry is more essential in war than the railways. Raw materials must be moved to mills and shops; parts must be moved to points of assembly; men and finished weapons and munitions must be moved to lines of combat or ports of embarkation. Transportation enters into every step. And this transportation is almost solely by rail.

This critical situation confronts every railway employee today. His work has taken on new and added importance. It is no longer merely or even primarily a means of livelihood; it has become an arm of the national defense. So long as American soldiers, sailors and aviators are facing an enemy and are fighting in defense of their country, railway men, who constitute the second line of defense, can do no less than their best to insure the steady flow of the materials and men needed to support the men at the front.

The work may be discouraging this year. Labor may be scarce and forces inadequate; materials may be difficult to secure. But such difficulties are neither new nor novel to maintenance men, trained as they are to meet without warning wrecks, washouts, blizzards and other emergencies. The demands of a war era will make new demands on railway men. They will face even more strenuous and critical days that will call for added courage, determination and resourcefulness.

These days also change our point of view. We shall endeavor, as best we can, to change with you and to bring to you information that will help you in solving today's specialized problems. We know, by your continued use of Railway Engineering and Maintenance through the years, that you have found it helpful to you in keeping abreast of the discoveries of other men. We shall try to add to its value in these wartime days by still more intensive coverage of these developments. We hope to become even more indispensable to you in the period which we are now entering.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

An Engineer's THREE R's

TECO CONNECTORS

spread the load on a timber joint more equally over the cross-section of the wood.

READY! There is no shortage of timber—immediate deliveries are certain.

RUSH! Prefabrication by the TECO Connector System of timber construction speeds the job and *gets the contract.*

REDUCES COST! The TECO Connector System cuts man-hours and material costs because fabricators deliver members ready to install—and permits lighter timber to do the work.

Get Complete Details—MAIL COUPON!

Timber ENGINEERING COMPANY

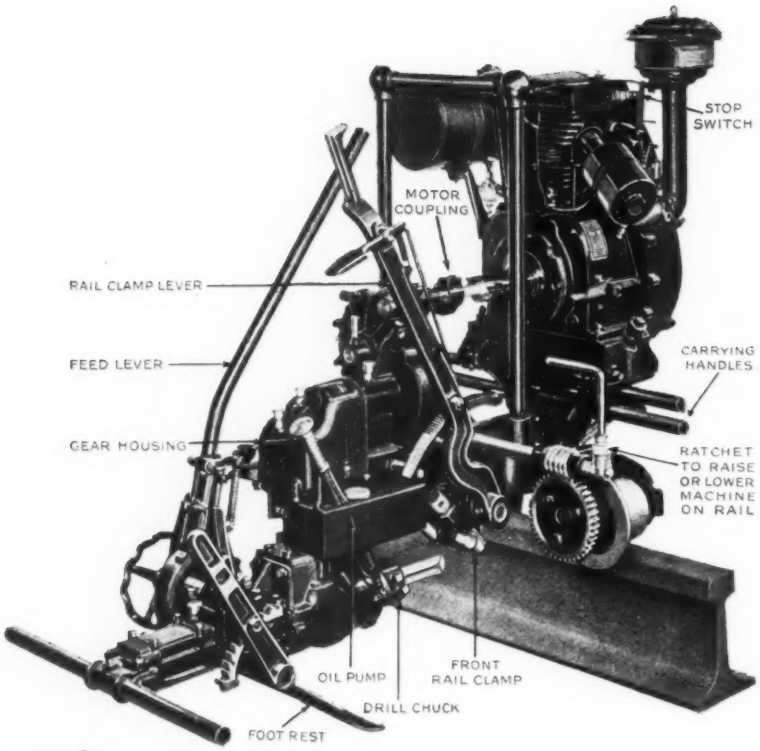
Dept. F-2 1337 Connecticut Avenue
WASHINGTON, D. C.

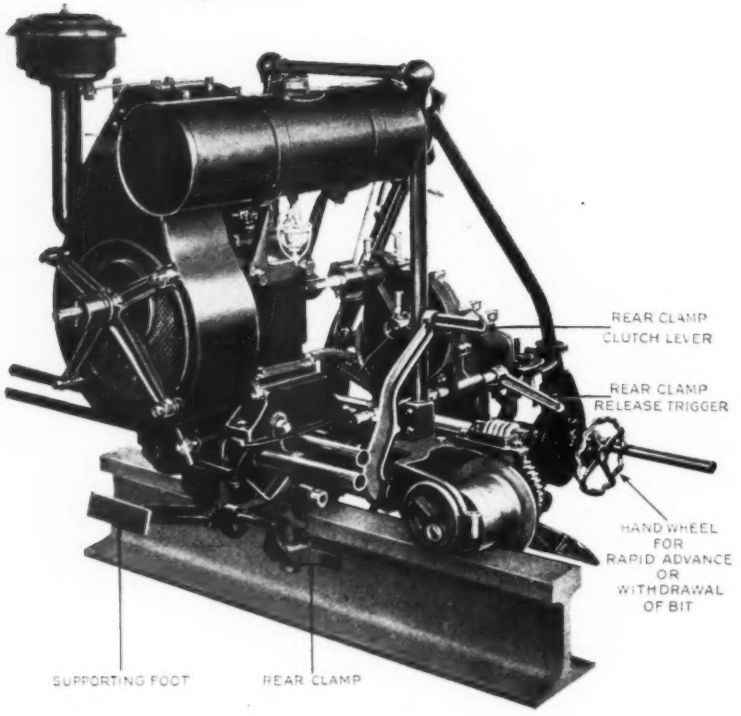
TIMBER ENGINEERING COMPANY, INC. Dept. F-2
1337 Connecticut Avenue, Washington, D. C.

Please send me without cost or obligation complete information on the TECO Connector System of construction.

Individual..... Firm.....

Street..... City..... State.....




REAR CLAMP CLUTCH LEVER
REAR CLAMP RELEASE TRIGGER
HAND WHEEL FOR RAPID ADVANCE OR WITHDRAWAL OF BIT
SUPPORTING FOOT
REAR CLAMP

The Everett Power M-W Drill

—Improved—

Greater speed, flexibility and accuracy of adjustment have been obtained.

Now, by operating a small ratchet, the entire machine can be raised or lowered on the rail and the bit can be quickly spotted to an exact point.

The Everett can be clamped over splice bars, or to rail without bars. It will drill rail through splice bar holes. It can be used for drilling nearly all holes in switch layouts where minimum clearances obtain.

The Everett is complete with every facility and adjustment for rapid and accurate drilling.

RAILROAD ACCESSORIES CORPORATION

Main Office
137 East 42nd Street
(Chrysler Building)
New York

Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 West Adams Street, Chicago

NEW YORK
30 Church Street

CLEVELAND
Terminal Tower

WASHINGTON, D.C.
1081 National Press Bldg.

SEATTLE
1038 Henry Bldg.

SAN FRANCISCO
550 Montgomery St.

LOS ANGELES
Union Bank Bldg.

Samuel O. Dunn, *Chairman of the Board*; Henry Lee, *President*; Lucius Sherman, *Vice-President*; Roy V. Wright, *Vice-President* and *Secretary*; Frederick H. Thompson, *Vice-President*; Elmer T. Howson, *Vice-President*; F. C. Koch, *Vice-President*; H. A. Morrison, *Vice-President*; Robert E. Thayer, *Vice-President*; John T. DeMott, *Treasurer*.

Subscription price in the United States and Possessions, and Canada, 1 year $2, 2 years $3; foreign countries, 1 year $3, 2 years $5. Single copies, 35 cents each. Address H. E. McCandless, Circulation Manager, 30 Church Street, New York, N.Y.

Member of the Associated Business Papers (A.B.P.) and of the Audit Bureau of Circulations (A.B.C.)

PRINTED IN U.S.A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

FEBRUARY, 1942

Editorials - - - - - - - - - - - - - - - - - 89
Public Opinion—Weather Forecasts—Trackwork Welding—A Railroad Achievement

How to Relay 3.37 Track Miles of Rail a Day—Organization Shown Essential - - - - - - - - - - 92
R. H. Carter, division engineer on the Illinois Central, describes well-equipped organizations that achieved enviable record on two jobs

What Lies Ahead? Toil, Toil and More Toil - - - - - - - 95
E. M. Hastings, ch. engr., R.F. & P., calls on maintenance men for determination in doing the tasks that lie along the "hard" road ahead

Reclamation of Manganese Trackwork by Arc Welding - - - 96
Points out importance of removing worked-hardened metal before welding and suggests welding technic found to be highly effective

Hauls Water for 40 Cents Per 1,000 Gal. in Overcoming Serious Shortage - - - - - - - - - - - - - - 100
Tells how Illinois Central, confronted with a drought in Southern Illinois, hauled 450,000 gal. of water daily to replenish supply

Kinked Track on Nor. Sou. Causes Freight Derailment - - - - 103
Report of I.C.C. gives details of accident on this road, involving a double kink, near Oakboro, N.C., on September 24, 1941

C. & O. Announces Annual Track Awards - - - - - - - - 105
Lists supervisor and foreman winners of cash prizes for excellence and proficiency in track maintenance during 1941

Ernal McCann Breaks Track Records - - - - - - - - - 105
Comments on the performance of this track foreman on the N. & W., who, for the last two years has received a perfect track rating

Novel Track Layout Obviates Necessity of New Turntable - - - 106
Tells of ingenious track layout devised by the D. & H. to preclude need for renewing table at Mechanicville, N. Y. for longer power

What's the Answer - - - - - - - - - - - - - - - 107
Stimulating Competition
Finishing Yellow Pine
What Size Ballast?
How to Transfer the Load
Lubricating Motor Cars
Packing Hydrant Pits
Free Movement for Switch Points
Insulating Enginehouse Roofs

News of the Month - - - - - - - - - - - - - - - 114

ELMER T. HOWSON
Editor

NEAL D. HOWARD
Managing Editor

MERWIN H. DICK
Eastern Editor

GEORGE E. BOYD
Associate Editor

JOHN S. VREELAND
Associate Editor

FREDERICK C. KOCH
Business Manager

TIE SEATS LIKE THESE
increase rail life and aid in providing smooth riding track

These two New Model Adzing Machines are among the eleven Nordberg Adzers which prepare tie seats for the rail laying operations on the Southern Railway.

These tie seats are typical of the improved quality of work done by the New Nordberg Adzing Machine. Roads that require all new rail be laid on machine adzed ties are most enthusiastic about the improvements of the new design over the earlier model. In addition to doing a better job of adzing, the easier handling and more simple adjustment of this new machine speeds up and improves the surfacing of ties and reduces the cost of this work. If your old machines have reached a point where a complete overhaul is required, and they no longer do a job in keeping with today's track standards, it will pay you to investigate the advantages afforded in this New Nordberg Adzing Machine.

Nordberg Power Tools For Maintenance Jobs

Adzing Machine	Spike Puller
Track Wrench	Rail Grinder
Utility Grinder	Precision Grinder
Power Jack	Rail Drill
	Track Shifter

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

Railway Engineering and Maintenance

Public Opinion

Knowledge of Railroads Sadly Lacking

IN an industry with a large measure of public contact and interest, it is obvious that widespread and accurate knowledge of the problems and achievements of that industry is of great value. In fact, this would appear to be a vital necessity if the control of that industry by representatives of the public is to be intelligent and constructive. For this reason, the Association of American Railroads undertook to ascertain what the American public knows and thinks about the railroads and retained the Opinion Research Corporation, an independent private research organization, to make a survey, by a process of scientific sampling, of the public conception of many phases of railway service. The results of this survey, which have recently been made public, are both interesting and disconcerting to those railway employees who have concern over the well-being of their industry.

Doing a Good Job?

For example, only 56 per cent of the people interviewed believe that the railroads have done a good job in preparing for emergency traffic, while 36 per cent believe that they have done only a fair job. Furthermore, 46 per cent believe that the airplanes have done their job best in the defense emergency, while only 20 per cent give this recognition to the railroads; incidentally, only 6 per cent believe that the trucks have done the best job. Two-thirds of the people, however, believe the railroads to be the transportation agency most important to defense, although 38 per cent of them believe that the railroads will not be able to meet all the traffic demands of the defense emergency.

Turning to public subsidization of the railways' competitors, 53 per cent of the public believes that the complaint of the railways on this score is justified, although 40 per cent do not concur in this position. In fact, 44 per cent believe that the railways have had the most help, while only 34 per cent so credit the trucks. Surprisingly, the very large proportion of those interviewed look with favor on government aid to the transportation agencies, the percentage approving such aid to the railways totaling 83 per cent, and to the trucks, 67 per cent. It is evident that the public has not been convinced that the principle of fair play has been violated in the support of the highway, waterway and air line carriers in competition with the railways.

In the pursuit of public opinion regarding the payments made by the trucks for the use of the highways, 49 per cent hold that the trucks pay less than their share, while 34 per cent believe that they pay "just about" their share, and 17 per cent believe that they are paying too much. Fifty-five per cent of the people favor more regulation of trucks by the state and federal governments, although they are influenced in this opinion by other than the elimination of unfair competition with the railways.

As regards the waterways, a majority of the people (60 per cent) have no opinion as to whether the inland waterway carriers are paying their proper share of the upkeep of the waterways they use. Of the remainder who do have opinions, nearly two-thirds (63 per cent) believe that the barge lines are paying less than their share, but 90 per cent of all these people approve this policy. Indicative of the unfamiliarity of the public regarding our waterways, only 20 per cent of the people interviewed were aware that the federal government owned and operated any barge lines. Furthermore, although only 3 out of 5 persons in the country are aware of the proposed Great Lakes-St. Lawrence waterway, three-fourths of those who have heard of it express approval.

This survey revealed a gratifying appreciation of the traffic-handling ability of the railways. Seventy-seven per cent believe that they are equipped to handle more freight than they were handling before the depression. An even larger proportion (82 per cent) are able to mention one or more specific improvements which contribute to this result, although the features most prominently in mind are streamlined trains, Diesel locomotives, better coaches and air-conditioning. Little mention is made of lower fares, improvements in safety or in freight service, better roadbeds, etc.

Which Handles the Freight?

The people are specifically uninformed with regard to the relative volume of freight handled by the railways, the highway carriers and the barge lines, for 37 per cent of the people interviewed believe that the truck lines haul more freight than either the railroads or the barge lines and, curiously enough, 27 per cent of the railroad employees or members of their families hold the same opinion (actually, the relative proportions of the traffic handled by these three agencies is—railways, 63 per cent; trucks, 8 per cent; and waterways, 18 per cent). Furthermore, it was found that more people can name specific advantages of shipping by truck than by rail.

In view of the many developments made by the railways during the last few years in introducing streamlined trains, air-conditioning passenger cars, new coaches, faster schedules in both passenger and freight service, lower fares and many other improvements of equally revolutionary character, it is disconcerting to learn that, when comparing the railways with the air lines and the trucks, 61 per cent rated the air lines most progressive, while only 16 per cent gave this recognition to the railways and the same number so rated the trucks.

In these days of growing tax consciousness, it is gratifying to note that 63 per cent of the public recognizes that the railroads pay for taxes the largest proportion of the dollar they take in. It is equally surprising to learn that a third of the people believe that the trucks pay more in taxes than the railroads. And it is disturbing to know that half of the people have no conception of the purposes for which railway taxes are used.

Especially surprising is the fact that nearly a third of the people have little or no conception of the cost of rail travel or are able to even approximate the cost of a trip. Equally disconcerting is the further fact that those who do make such estimates tend overwhelmingly to overestimate the cost of a trip by coach and almost half of the people over-estimate the cost of a trip by rail first class.

What Interest to Railway Employees?

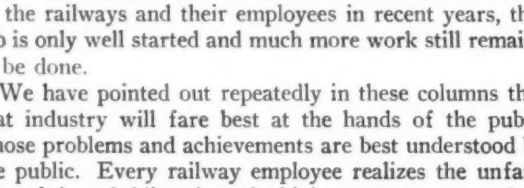
What do such facts mean to the railways and to railway employes? They reveal, in the first place, a surprising lack of familiarity with information that is common knowledge to those in railway service. They reveal also that, fine as is the work of education that has been done by the railways and their employees in recent years, this job is only well started and much more work still remains to be done.

We have pointed out repeatedly in these columns that that industry will fare best at the hands of the public whose problems and achievements are best understood by the public. Every railway employee realizes the unfairness of the subsidies given the highway, waterway and air lines, in competition with the railways. He recognizes also the magnitude of the contributions that the railways make to the support of government and the public schools. He knows of the revolutionary improvements that have been made of late in passenger service and also in the less spectacular but even more important freight service. And he knows that in times of blizzards, ice, floods and fog, the railways are the one agency that does not fail.

But this knowledge, splendid though it is, is not enough. It must be disseminated more widely until every fair-minded person, and most people are such, is made acquainted with the facts. This is a task that can be performed best by railway employees; in many respects, it can be done only by employees.

The wide prevalence of incorrect information regarding the railways deprives employees of the credit to which their accomplishments entitle them. It also diverts from the industry from which they derive their livelihood, traffic and earnings that, with proper public knowledge, would accrue to it.

This situation constitutes a challenge to railway employees. They can do much to correct it. They will do so if each of the million and a quarter workers on the railways acquaints himself with the basic facts regarding the railways and then makes it a point to acquaint those with whom he comes in contact with these same facts.



Weather Forecasts—

Restrictions Add to Hazard, Unless—

WITH severe storm conditions one of the worst enemies of safe, on-time train operation at any time, and especially during the winter, maintenance men in the northern parts of the country have long since prepared to meet the worst conditions that they can reasonably anticipate during the present winter. However, and especially in the light of the vital importance of uninterrupted rail transportation to our determined, large-scale war efforts, they must not be lulled into a false sense of security by the unusually open and mild winter that, with a few local exceptions and one general cold spell, has prevailed over the country thus far. Many days are still ahead when heavy snow storms can strike with little warning, and, like our nation's combat forces, maintenance men must not only be prepared but must be constantly on the alert.

Other developments of recent months make it especially important that this note of warning be thrown out at this time, the two most important of which are the dwindling labor market, upon which many roads must rely for extra laborers to cope with severe snow storms, in spite of the more extensive use that is now being made of switch heaters and other types of snow-fighting equipment, and the government's restrictions upon the general distribution of weather reports by radio and newspapers, which have reached the proportions of almost total "blackout" in areas along the Pacific coast. Both of these new or aggravated developments place added responsibilities upon the maintenance forces because of the handicaps they present, and can prove embarrassing, if not serious, unless offset to the greatest extent possible by supplemental means or arrangements.

As regards labor, previous arrangements with agencies and men lined up individually should be checked at frequent intervals to insure that changed local or general conditions have not depleted the anticipated available supply. Where shortages appear certain, it is not necessary to suggest that suitable steps must be taken to overcome or offset them, even to the provision of additional mechanical snow-fighting equipment where this seems advisable and is available.

As regards the censorship on the general dissemination of weather reports as a war measure, the problem may not be as simple, because the maintenance forces generally over the far-flung lines of the railways, long operating on the theory that to be forewarned is to be forearmed, figuratively keep their ears to the ground for the earliest possible advance warning of approaching storms, and can be handicapped seriously by the restrictions on weather broadcasts and bulletins that have been imposed.

It is certainly not the intention of the government or the Weather bureau to handicap the railroads in their struggle against blizzards or other storm conditions, for it is certain that they realize what this might mean in the way of serious transportation delays and tie-ups, and they have no intention of imposing such handicaps insofar as they can co-operate with the railroads without giving aid and comfort to the enemy. But a general restriction has been placed on all forecasts of other than a local nature, and covering a period in excess of 24 hours, with special restrictions upon reporting sky conditions, specific temperatures and wind direction and intensity at any time, especially along the Pacific Coast.

That these restrictions against general broadcasts and news releases need not handicap the railways seriously is indicated by the willingness of the Weather bureau to make confidential reports to designated railway officers or their authorized representatives, if special arrangements are made to this end—but these arrangements must be made, and previous loose arrangements that may have been in effect in the past may not now be sufficient. The Weather bureau asks for a detailed statement on file of what specific conditions on a railway may be affected adversely by storm conditions, including an estimate of the depth of snow or wind velocity that might cause difficulty, together with the name or names of those who are authorized to ask or to receive such information as the bureau is permitted to give out. In other words, just because a previous satisfactory arrangement has been in effect with the Weather bureau does not mean necessarily that one can expect the same prompt and detailed reports to which he has been accustomed in the past. In fact, even under such new arrangements as can now be made with the bureau, the railways cannot expect as specific information as they have been accustomed to receive in the past, but, having followed the new requirements to the letter, they can be assured of the most prompt and complete forecasts that are available. Maintenance officers must take the initiative in this regard. To do otherwise is to place their lines in unnecessary jeopardy.

Trackwork Welding—

Valuable Information Made Available

WITH steel track materials of all kinds, and especially frogs, crossings and other items of special trackwork, high in the list of materials that are now difficult to obtain readily in view of our country's armament requirements, no stone should be left unturned to secure the maximum service life from every element of these materials. To this end, welding, used extensively in the past to build back worn material and to repair defects, is bound to assume still greater prominence—and this is true to no greater extent than in manganese steel castings, which have presented special difficulties for successful welding in the past.

In view of this situation, the article in this issue on the reclamation of manganese trackwork by arc welding is particularly timely. As the result of extensive laboratory studies and investigation, the author presents facts that are not widely understood or readily available elsewhere, and, in any event, facts that have heretofore been lacking adequate support of a scientific nature. The principal conclusions derived from the studies described are (A) that work-hardened metal should be removed from the surface of worn manganese trackwork castings to a depth of at least ¼ in. before new weld metal is applied, and (B) that the best results will be obtained by keeping the total heat of welding as low as possible.

These facts, along with the recommendations presented for preparing castings for welding, the welding procedure itself, and finishing operations, should have widespread dissemination among the track welding forces, especially at this time when it is becoming necessary to break in new welders to handle the enlarged repair and reclamation programs in sight, and to replace experienced men that have been called into the armed forces of the country, or have left to work for defense industries.

A Railroad Achievement—

Acclaimed in the Public Press

IN an article under this caption that appeared in the Chicago Journal of Commerce of January 24, and in many other newspapers over the country on that date, David Lawrence, nationally known columnist, called attention to the remarkable service rendered the nation by the railroads in December in a manner that should strike a responsive chord in every railway maintenance man. The following excerpts are quoted from this syndicated article by Mr. Lawrence.

"A high government official has released the information that 600,000 troops were moved within the boundaries of the United States in the 16 days before Christmas. For that movement, a feat unparalleled in the nation's history, credit must go to the railroads of America, their executives and their workers.

"Seventy-five per cent of the soldiers actually had sleeping accommodations and the remainder traveled in day coaches. Not a single company had to be moved in freight cars. This whole troop movement, which embraced travel from nearly every section of the country, was achieved with the loss of only one man—a colored cook who was killed in a minor collision.

This movement was the biggest thing ever attempted on American soil. The odd part of it was that the public hardly noticed the movement because delays to civilian traffic were the exception rather than the rule. What makes the performance of the American railroads even more remarkable is that along with the troops traveled freight cars which bore their supplies and equipment. The soldiers went fully equipped—ready for action. That means they had everything along. To carry this equipment—tanks, guns and ammunition—was a tremendous transportation job in itself. But it was done.

"To the locomotive engineers, the trainmen, the conductors, the brakemen, the dispatchers, *and the hundreds of thousands of maintenance men* who worked long hours and with a spirit of co-operation that was typical of their efficiency—for they have always been in the forefront of American labor—there is a tribute due, and it will doubtless be forthcoming from official quarters."

How to Relay 3.37 Track Miles in One Organization

One of the Bolting Machines Used in the Highly Mechanized Relay Operations in the Chicago Terminal

R. H. Carter

By R. H. CARTER*

Division Engineer, Chicago Terminal Division, Illinois Central, Chicago

PROGRAMMING and organization are important for any enterprise; their importance in relaying rail cannot be overemphasized. In fact, rail replacement work offers a splendid opportunity for the close and accurate organization of a gang.

Recently the Illinois Central completed the relaying of 8.39 miles of track with 112-lb. rail, including four No. 10 turnouts, in a single-track main line between Broadview, Ill., (15 miles west of Chicago) and Freeport; and 11.70 miles of track with 112-lb. rail, including three No. 10 turnouts, in the southbound passenger main track in multiple-track territory between 66th street, Chicago, and 155th street, Harvey, Ill. This work was completed in record time. The speed of the rail laying was made possible by careful planning of the preparatory work and the organization of the gangs to insure the utmost production. Unlike many rail laying jobs, the gangs on this work were composed principally of regular men taken from sections in the vicinity, although some extra gang men were also used.

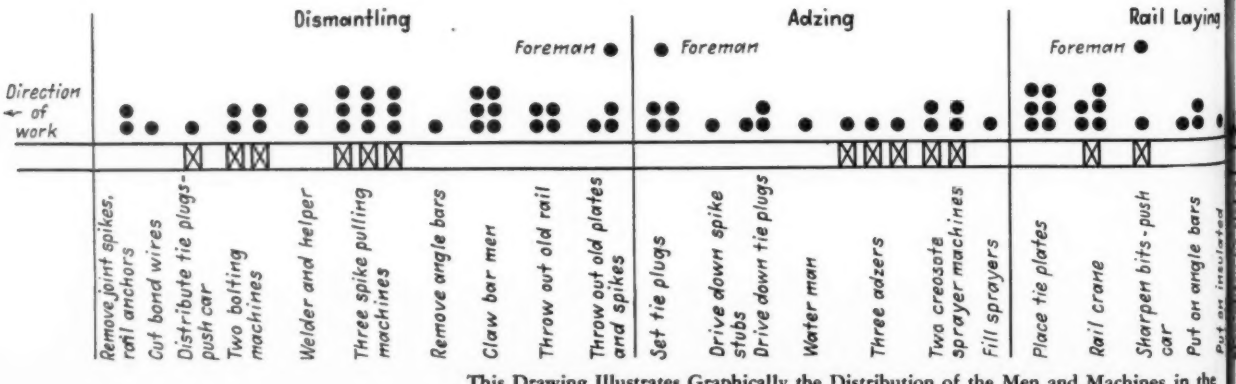
*Abstracted from an address presented by Mr. Carter before the Maintenance of Way Club of Chicago on November 24, 1941.

Preparatory Work

The new rail is 39-ft. 112.28-lb. RE section, controlled-cooled, with the ends hardened and beveled. The ties are 6-in. by 8-in. by 8-ft. and are protected with 7¾-in. by 11-in. double shoulder tie plates of the 6-hole type, ¾ in. thick and canted 1 in 44. Angle bars of the 4-hole oil-treated toeless type, 24 in. long were used with cut spikes with a reinforced throat, ⅝ in. by ⅝ in. by 5¾ in.

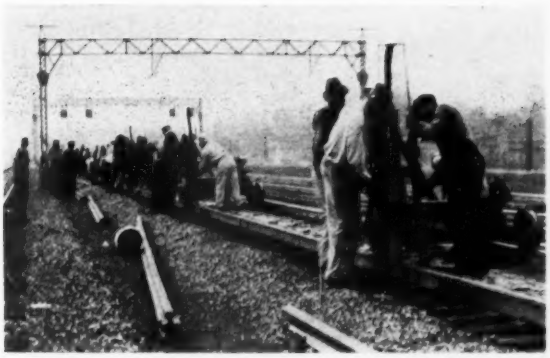
The rail and fastenings were received in gondola cars. The rails were unloaded with a work train with two full-revolving cranes mounted on flat cars. After the rails were unloaded, the ends were painted with a metal preservative, except where insulated joints were to be installed. These were not painted, to prevent the freezing of insulation to the rail ends, which would cause the insulation to break under the expansion and contraction of the rail.

Before the new rail was unloaded, the track supervisor, with the assistance of a track man, measured the old rail with a steel tape and marked the locations where new joints would



This Drawing Illustrates Graphically the Distribution of the Men and Machines in the

# of Rail a Day—
Shown Essential



Above Are Shown the Three Spike Pulling Machines, and Below the Three Adzing Machines, Used in the Chicago Terminal

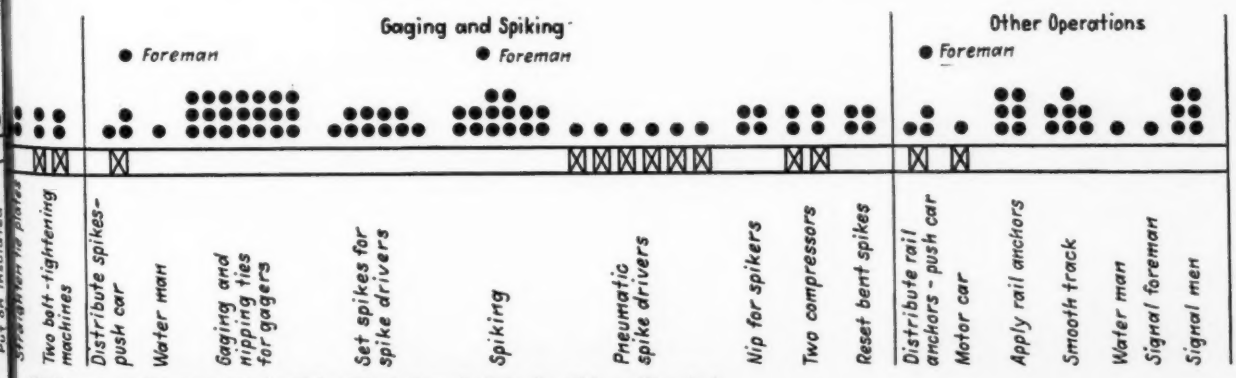
In this article Mr. Carter describes how careful planning and thorough preparation enabled the Illinois Central to relay 3.37 miles of track in one day on the Chicago terminal and 2.36 miles of track a day under traffic on a single-track main line

come, on the outside of the old rail. With the new joints located in this manner, the location of butt welds needed for road crossings was known. This was also a convenience in the unloading operations on single track territory, since, if it became necessary for the work train to go into a siding to clear for more than one train, it was possible to continue unloading while in the siding, and to go out a short distance from the siding and continue unloading between trains. Marking the old rail in this manner also saved considerable time later in the rail laying operations, since it enabled the material to be unloaded exactly where it would be needed.

New tie plates were placed, two to each tie, in the center of the track. One keg of spikes was distributed every five rail lengths on each side of the track. One keg of track bolts was unloaded on each side of the track at intervals of 20 rail lengths. One sack of 50 anti-creepers was unloaded every 100 ft. One bundle of tie plugs was unloaded every five rail lengths. The tie plugs, anchors, bolts and spikes were hauled out and distributed by motor car and push cars on single track territory to avoid their going down the enbankment, which would have occurred if they had been thrown out of coal cars in the work train.

After the rail was unloaded, angle bars were placed on the leaving end (based on the direction of the relay) of the new rails, with two bolts in the joint. The other two bolts with nut-locks were placed nearby. The lowering of the ballast, which was done to facilitate the operation of the adzing machines, was completed before the receipt of the rail and fastenings. The ballast in the territory relaid is crushed slag and rock.

All rail laying equipment was checked and tested before the work was begun, and then shipped from the motor car repair shop to the point nearest the location where the rail was to be laid. At the end of each day, during the progress of the rail laying work, all this equipment was checked thoroughly, and gasoline and oil were placed in all the machines. A repairman and a helper were constantly on the job.



171-Man Gang Employed in the Relay Work Described, in the Chicago Terminal

In our road crossings, 90-lb. scrap rails were used for flange rails. Prior to the laying of the new rail, these flange rails were removed, together with a portion of the asphalt paving, and 4-in. by 10-in. planks were installed. Just before the rail gang reached the crossings, the planks were removed, and were then replaced after the new rail was laid. After the new rail was surfaced, scrap 110 lb. rails were installed as flange rails and the crossings completed. The 112 lb. rails for the road crossings were butt-welded before they were laid in the track. Another item that greatly speeded up the progress of the rail laying work was the fact that the turnouts were installed a few days ahead of the rail laying.

In planning for the rail laying work, a meeting with the supervisors involved was held several days in advance of the rail laying to plan where the work would start, decide on the number of men that would be used and determine how many men each supervisor would provide, taking into consideration, of course, the number of men available. The supervisors then instructed their foremen and laborers in advance exactly what each man would do when the rail laying was started. The plan was then discussed with the superintendent in charge and full co-operation of the operating department was secured.

Since the supervisor on the Freeport district did not have sufficient men, he was given assistance by the supervisors on the north and south ends of the Chicago terminal. Their men traveled to and from the job in company trucks and in their own automobiles.

Rail Laying on Freeport District

In laying rail on the Freeport district, a total of 160 men were used, including 138 laborers, 8 machine operators, 1 welder, 1 welder helper, 5 foremen, 1 signal foreman and 6 signalmen. Three supervisors were also assigned to the wrk, one to the front, another in the middle and a third in the rear. This provided constant and competent supervision. The signal supervisor was also present throughout the day to see that the insulated joints were installed correctly and that the bonding was handled properly.

The organization and specific operations of the men in this gang were as follows:

1 flagman
1 foreman and 2 men on a motor car took out road crossings and trucked water
1 man pulled joint spikes
1 man removed rail anchors
1 man cut bond wires
2 operators and 2 laborers with two bolting machines removed track bolts
1 welder and 1 welder helper burned off frozen track bolts left by the bolting machines
1 man with a sledge removed the old angle bars
9 men with three spike pulling machines (3 with each) pulled spikes
3 men pulled spikes left by the spike pulling machines
4 men with bars threw out the old rail
1 foreman
3 men pulled old spikes
1 water man
3 men threw out old tie plates
1 man drove down deadhead spikes
6 men set tie plugs in the spike holes
4 men drove the tie plugs down
3 men with three adzing machines adzed the ties
2 men with a creosote sprayer applied creosote on the adzed surfaces of the ties
5 men placed the new tie plates on the ties
1 rail crane operator
4 laborers with the rail crane set in the new rail and placed the expansion shims
1 man on a push car benind the crane sharpened adzing bits
4 men with a push car distributed spikes
1 foreman
3 men put on the new angle bars and started the nuts on the bolts
1 man put on insulated joints
4 men with two bolting machines tightened bolts
2 men straightened tie plates under the rail
1 water man
10 men set new spikes for the spike driving machines
12 men with gages and spike mauls gaged every fifth tie
6 men nipped ties for the gagers
1 foreman
6 men with spike driving machines drove down spikes
4 men pushed 2 air compressors
12 men with spike mauls completed spiking
4 men drove down joint spikes and spikes left by spike driving machines
12 men tamped track, drilled holes and applied rail anchors
1 foreman
1 water man
2 men with a motor and push car replaced road crossings and picked up tools
1 flagman
1 signal foreman
6 signalmen

On the first day, Monday, October 6, after waiting for an eastbound passenger train and a westbound freight train, work was commenced on the south rail at 7:45 a.m. The gang quit work shortly after 5 p.m., after laying 506 rails (1.88 track miles) in the south rail and clearing for eleven trains. A very heavy fog prevailed until 11 a.m. and it then rained intermittently the remainder of the day.

On Tuesday, the gang relaid 615 rails (2.28 track miles) on the north rail, starting at 7:20 a.m., and quitting at 4:45 p.m., clearing for nine trains. This was a day of bright sunshine, the weather was cool and there was a strong west wind.

On Wednesday, the gang began work on the south rail at 6:15 a.m. and quit at 5:30 p.m. after laying 636 rails (2.36 track miles) and clearing for seven trains. While working between the west and east switches at Cloverdale, progress was helped considerably by allowing two eastbound passenger trains and one westbound freight train to go through the passing track. The weather was cool with bright sunshine. Thursday, the gang started on the north rail at 7:30 a.m., and quit at 9:00 a.m. after laying 105 rails and clearing for two trains. A cold rain fell all day. On Friday, work started on the north rail at 7:20 a.m. and was completed at 2:25 p.m., the track being cleared for eight trains. The weather that day was cool, with bright sunshine and a strong west wind.

During this rail laying work, the trainmaster on the Freeport district followed the gang constantly. An operator with a field telephone kept up with the gang and was in constant touch with the dispatcher and the trainmaster conversed with the dispatcher from time to time through the field telephone, in order to familiarize himself with the movement of trains, and to assist in the bunching of trains. In this manner, it was possible about noon, on each of the four days consumed in the laying of this rail, to allow five trains, three eastbound and two westbound, to pass the rail gang within one hour. Having to cut in only once to allow these five trains to pass was of great assistance, for if it had been necessary to clear for each train separately, a considerable amount of time would have been lost.

On Wednesday, October 8, two days after the rail laying was begun, a work train with one crane started loading the old rail and all this rail, angle bars and fastenings were loaded by Monday, October 13. This rail was sold to one of the defense plants, and it was necessary that it be loaded and shipped to its destination as quickly as possible.

After the relay was completed on the Freeport district, it was decided to surface the new rail as quickly as possible to prevent damage to the rail and to remove the slow order of forty miles per hour that is customarily placed on new rail. Accordingly, the morning after the completion of the rail laying, an extra gang was started surfacing at one end, while four sec-

(Continued on page 104)

What Lies Ahead? Toil, Toil and More Toil*

By E. M. Hastings

Chief Engineer,
Richmond, Fredericksburg & Potomac,
Richmond, Va.

E. M. Hastings

WHAT lies ahead? I do not think that any human in the whirl of present-day events can foresee accurately what may lie ahead, even in the comparatively near future; but I decided to talk to you on this subject because of the challenge which it presents at a time when the best in men, particularly their thinking, needs to be challenged as never before.

These are not ordinary days that are with us. History and the recorded works of men in ages past have given to men guideposts on the highway of time, but now there does not seem to be much in past action to guide and direct future action, or to provide the answer to the problems of the present, much less the problems that loom on the horizon of the future. Therefore, what we need at the present time is independence of thought, co-ordination of ideas, co-operation in effort and an everlasting determination to do the task that confronts us now and to prepare ourselves for the tasks that will be ours in the days ahead?

What lies ahead? Almost anything that your imagination may picture. But of one thing I think we can be certain—and I say it without pessimism and with a full realization of the import of what I say—and that is that there is a hard road ahead; one that has many a turn and many a difficult grade; one that can be traveled only by those who are determined to succeed, and, in the words of Winston Churchill, it will be negotiated by the "blood and sweat and tears" of those who journey thereon. I wish that it might be said that there are brighter days ahead of us in the near future, but I do not think it is wise to try to fool ourselves. We can succeed only as we become realists enough to see and understand the trend of events.

*Abstract of an address before the Maintenance of Way Club of Chicago on October 27, 1941. Made prior to "Pearl Harbor" and our full participation in the current war, these comments have still greater significance and force today than they had at the time they were made.—Editor.

Maintenance Men Alert

What lies ahead? I know of no group of men better prepared to face the problems of our country today than a group of railway men, particularly, maintenance of way men, who day after day have placed before them new problems, new conditions, new practices, new materials and new men to be educated. The tasks of these men fit them to be resourceful, and I am sure that upon the resourcefulness of men will depend the success of our ventures into the future.

We who live along the eastern seaboard and for a few hundred miles inland are, I think, becoming more fully aware of the dangers that confront us and of the preparation that we must make to assure the continuity of our transportation service. We have been studying the ways and means of civilian protection in war time, the means of civilian evacuation of danger areas, the access to and from congested manufacturing centers and densely populated areas, the vulnerable points or places along our transportation systems, and the making of plans for protection, restoration and repair.

Every one of you men engaged in maintenance of way work on the railways is prepared to meet emergencies, and when disasters, such as floods and storms, wreak destruction to your railway properties, you know what to do and how to do it. But there may lie ahead of us another type of destroying force, and whether it comes or not we must be prepared to meet it, have the materials, the equipment and the trained men to carry out the repair or restoration promptly, so that trains can move with the minimum of delay. A paralysis of our main railway lines for any length of time would be fatal.

I am not trying to paint a dark picture—I am only trying to get you, as I try to convince others to whom I have the privilege of speaking, to be prepared to meet whatever situation may arise. There are entirely too many people in this country of ours who are perfectly unconcerned about the tremendous happenings in the world about us, and who are seemingly satisfied that it "can't happen here"—but it can, and if it does we must be prepared.

What lies ahead? Well, for the railroads there will be an increasing load of traffic to be carried, more and more men and munitions to move as our great defense efforts reach their peak and we arm ourselves as no nation has armed before in history. This calls for the best that men can give. We must maintain our railways to the highest possible standards. We must make of them the indispensable traffic arteries of the country. We must build into them the best material obtainable. We must man them with the best possible men—men who are loyal and devoted, unselfish and sincere.

English Roads Show Way

Many interesting and instructive things have come to us through our observers sent to England. There, the railways are faced with grim war and all the terrible destruction that comes from bombing raids. Most interesting to me is the news that the main-line railways of England have not been out of service for long periods of time; repairs are made quickly. The railways are prepared to meet emergencies. They have stocks of material at key points. They even have filling materials at strategic points along their rights of way to fill bomb craters. And above all, they have manpower—manpower that is alert, ready and aggressive.

I prepared a list of questions concerning railway matters to be asked of maintenance of way officers in England by a War Department representative who returned to the United States early in October, 1941. These questions, along with others, were asked and the answers obtained. The whole report is now in the hands of the War department and I hope that shortly we will be able to make the answers available to railway engineering and maintenance officers in this country through the National Technological Civil Protection Committee, on which I represent the American Railway Engineering Association. At this time I am not permitted to make the information public, but I can say to you, that you must be prepared to do all kinds of repair work. Hence you should have, always within reasonable limits, the materials available to restore traffic promptly; have worked out plans for alternate routing; have equipment available for the removal of

(Continued on page 102)

Extensive Laboratory Study Has Greatly Improved the Technic of Welding Manganese Trackwork Units, Whether Carried Out in the Track, Alongside or in the Shop

Reclamation of M

This article, based upon a metallurgical investigation of service-worn castings, points out the importance of removing work-hardened metal before welding. It also suggests a welding technic that has been found highly effective in producing sound, durable welds

WITHIN the last few years the American railroads have effected outstanding economies in operating and maintenance costs while meeting the rigid safety requirements imposed upon them. Some of these economies are the result of research toward obtaining the best in designs and materials. Others have come through the reclamation of conventional material and the study of reclamation processes in order to obtain maximum service from them with a minimum of expense. The reclamation of manganese steel trackwork and welding procedures in connection therewith may be properly classified under the latter heading.

Improved Foundry Practice

The advent of manganese steel trackwork welding some years ago encouraged a program of research to eliminate such imperfections in new trackwork castings as had made welding necessary and difficult. Much has been accomplished since then by changes in design and standards of manufacture, as well as in new developments, to increase initial service and to insure greater over-all service life. The progressive manganese steel foundry of today no longer depends exclusively on the external inspection of a casting to determine its soundness and ability to withstand the high-speed impacts of heavy wheel loads, but is guided by well-equipped research laboratories employing X-ray equipment capable of exploring the interior of castings up to five inches in thickness. Its facilities also include laboratories to control the sand used in molding, and the elements necessary for correct metal analysis and to check the tensile strength, impact resistance, ductility and hardness of the castings produced.

Greater Abuse Today

The statement is made frequently that manganese steel trackwork castings manufactured in the distant past stood up better in service than those produced in recent years. Many maintenance of way engineers, as well as others, however, acknowledge that the apparent longer life of this type of material in the past merely reflects the fact that loads and speeds were less severe in earlier years, and that when imperfections existed, they were sufficiently below the running surface to permit a maximum amount of wear and ultimate scrapping of the casting without the knowledge of their existence. However, with increased speeds and heavier wheel loads, any serious defects were likely to become apparent, particularly when economic conditions demanded that each unit deliver the utmost hours of service within limits of safe operation. Welders engaged in repairing manganese steel castings which were (and in some instances still are) produced by less modern foundry practice, will still encounter shrink holes, sand and other inclusions, as well as gas porosity, all of which increase the difficulties of obtaining satisfactory welds.

Co-operative study by casting manufacturers and users has resulted in the production of improved castings which, when severely worn in service, can be reclaimed by welding much more satisfactorily than was possible formerly. Likewise, metallurgical research and study of welding procedures and materials are bearing fruit in prolonging the service life of reclaimed frogs and crossings.

We, in this paper, are interested primarily in contributing the results of our own research work to the present fund of information, to aid those whose supervision of trackwork includes welding in the reclamation of manganese steel castings.

Work Hardening

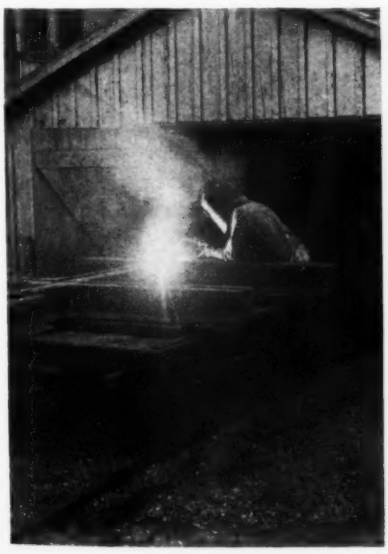
The service conditions imposed upon manganese steel castings subject the metal to a dynamic compression, which can be described otherwise as repeated impact or wheel pound. As is generally known, repeated impact work-hardens manganese steel, and, where the metal "flow" under such impact exceeds the ductility of the material, there may follow incipient failure by cracking. Work hardening can be developed to a point where all ductility is lost. While no accurate data are available, this limit is believed to be considerably above 500 in the Brinell scale of hardness. Numerous failures in the nature of welds peeling from the parent metal have occurred where weld metal was deposited directly upon such work-hardened surfaces. While visiting trackwork welding crews on various railroads of the country, a diversity of methods of preparation for and the welding of worn manganese steel frogs and crossings has been found. Some crews weld directly upon work-hardened surfaces, while others remove by grinding any spalled or laminated metal, surface cracks or other defects.

The question has often been asked as to how deep is the "flowed" or

Manganese Trackwork— by Arc Welding

By D. B. RICE
Welding Engineer
American Manganese Steel Division
American Brake Shoe & Foundry Company

work-hardened layer on worn manganese steel trackwork, so that a guide may be available for the welding technic and practice to be employed in repairing worn units. To learn, if possible, the answer to this question, and how much metal should be removed from a worn manganese steel frog or crossing before depositing the weld metal, two adjacent sections were prepared from a frog which had been worn down ⅜ in. These sections were cut under water, using a ⅛-in. high-speed cut-off wheel, and submitted to our research department for examination. Two specimens for microscopic examination were cut from one sample and Brinell hardness determinations were made at various distances from the worn surface of one of them. The other specimen was polished and hot-etched on one side, while a detailed Rockwell hardness exploration was made on the opposite side.



Repairing a Damaged Manganese Crossing Frog at a Railroad Frog Shop

Depth of Work Hardening

Study of the hardness exploration chart, Fig. 1, will show that work-hardening extends to a considerable depth. The intensive hardening indicated by the series of Brinell impressions taken upon the worn surface of the casting shows that this extreme condition is limited to the actual wearing surface, especially where false flanges of worn wheels had exerted maximum pressure, and also where new wheels had transferred the maximum load. The upper row of Rockwell hardness readings shows quite plainly the increased hardness developed where the material was deformed or had flowed under impact and pressure. This is especially noticeable in the upper left hand corner of the chart where no surface hardening is present, but where the internal metal had been hardened considerably by the extruding action of wheel pressure. Analysis of the chart leads to the conclusion that light wheel loads tend to produce the surface hardening, while heavy loads cause deeper hardening and more extensive flow.

Microscopic examination of samples cut from the first specimen revealed indications of appreciable work-hardening to a depth of at least 0.80 in. These indications are in the form of slip bands in the individual grains of austenite. Figure 2 (250 magnifications) shows the density of the slip bands in the section parallel to and 0.24 in. below the worn surface. Similar photo-micrographs taken 0.50 and 0.80 in. below the worn surface show progressively decreasing density of slip bands, which, in turn, may be interpreted in terms of decreasing work-hardening. By comparing Fig. 2 with Fig. 3, where the absence of slip bands denotes total lack of work-hardening (although some carbide precipitation from heat is present along the grain boundaries), one may obtain a good conception of the varying degrees of hardness resulting from cold working, which exist to a considerable depth below the worn surface of trackwork castings. Actually, these slip bands indicate the precipitation of sub-microscopic ferrite and manganese-iron carbides as a result of the cold working. Increased hardness and decreased ductility are reasonably in proportion to the density of the slip bands and the carbides so precipitated.

The microscope also revealed the presence of small cracks in the work-hardened surface. These cracks extended to a depth of ¼ in. in some instances, and are the result of flow of the metal under impact.

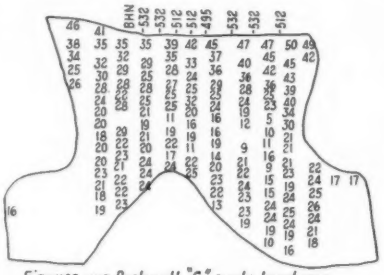
Effect of Heat

The combined effects of work-hardening and the heat of welding must be considered if good results are to be attained by welding for purposes of reclamation. Microscopic study of the effects of the heat of welding on manganese castings shows that where the temperature of the parent metal has been raised high enough to overcome the sluggishness of the transformation of the metastable austenite, considerable precipitation of manganese-iron carbides will

take place. This precipitation occurs at the grain boundaries and is the product of both time and temperature. Low thermal conductivity tends to concentrate it in a narrow band adjacent to the line of fusion when the intervals of heat application are not excessively long. It is characterized by an increased hardness, together with decreased ductility.

Figure 3 indicates the precipitation present in the manganese steel parent metal ¼ in. below the line of fusion of a nickel-manganese weld. No work-hardening had occurred prior to welding, as indicated by the lack of typical slip band formations. Carbides precipitated by the heat alone are apparent along some boundaries of the austenite grains. If cold-working precedes heating, much of the carbide will be precipitated along the slip planes; the total amount thrown out of solid solution under the combined conditions will be greater; and the increase in hardness and the decrease in ductility will tend to be greater than with either condition alone. An exact evaluation of these two factors is not available at the moment, because such facts are obtainable only through a long series of careful experiments.

Figure 4 is representative of the parent metal structure in work-hardened manganese steel below the junction of a nickel-manganese steel weld deposit. A study of this illustration and comparison of it with Fig. 3 will show quite conclusively the effect of high temperatures directly below the weld metal deposit in the quantity of carbides precipitated. The combined precipitation by both heat and previous work-hardening has produced a large percentage of carbide in the



Hardness equivalents

Rockwell "C"	Brinell number
10	185
20	225
30	285
40	375
50	490

Fig. 1—Hardness Exploration Chart, Showing Extensive Internal Work-Hardening of Manganese Steel Trackwork Members. Extreme Hardness Is Limited to the Wearing Surface

area, with its proportionate increase in hardness and decrease in ductility.

The conclusions derived from these studies are as follows:

(A) Work-hardened metal should be removed from the surface of worn manganese trackwork castings to a depth of at least ¼ in.; and (B) Optimum results will be obtained by keeping the total heat of welding as low as possible. Using these conclusions as a basis, an effort was made to develop a procedure for the preparatory work and a welding technic to minimize inherent disadvantages in manganese steel trackwork welding, and thus obtain satisfactory service from reclaimed castings.

Preparing Casting for Weld

There are certain areas on the surface of all manganese steel trackwork castings which are subjected in service to impact and the heaviest concentrated loads. It is known that when weld failures occur, they are invariably within these areas. We feel justified then in suggesting the removal of at least ¼ in. of the worn, cold-worked surface within the limits of the so-termed "impact areas." In many cases, particularly in the case of crossings, this should be increased to the depth of the indicated flow on the wall of the flange-way along the edges of the receiving points. The grinding should be done so as to provide a shelf with a preponderance of horizontal surface to receive the deposited metal, rather than to bevel off at an angle. This is because manganese steel welds in compression have considerably more impact resistance than those in shear.

To insure the removal of extreme work-hardened material, a rough test, suitable for field use, may be made with an ordinary center punch. Very little impression will be made by such an instrument upon steel having a hardness of more than 400 Brinell, but when material has been reached

Fig. 2—(Below) Photo-Micrograph, 250 X. This Section Was Parallel to and 0.24 In. Below the Wearing Surface of the Frog

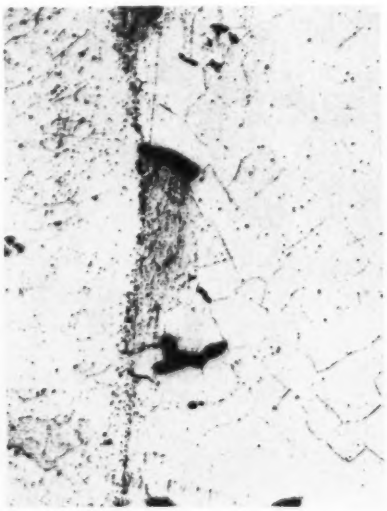


Fig. 3—(Above) Photo-Micrograph, 50 X. Nickel-Manganese Steel Weld Metal (Left); And Manganese Steel Base Metal (Right). Shows Carbide Precipitation in Boundaries of Austenite Grains in Non-Work-Hardened Base Metal

Fig. 4—(Below) Photo-Micrograph, 50 X. Nickel-Manganese Steel Weld Metal (Left); and General Carbide Precipitation in Work-Hardened Manganese Steel Base Metal (Right), A Very Brittle Structure

which is 250 Brinell or under, the punch indications are appreciable.

Where it is necessary to remove large amounts of work-hardened metal, conservation of time dictates the use of oxy-acetylene or arc cutting. When using the acetylene torch, a relatively high oxygen pressure is preferable to speed up the operation and to reduce heat concentration. Arc cutting should be controlled as in the case of welding to avoid excessive local heating with its resulting precipitation of carbides to a considerable depth. Where speed is essential, as on work being done under traffic, the control of localized heat may be accomplished by making cuts of short duration, and by immediately quenching the cut surfaces and surrounding area of the casting with cold water. All torch or arc-cut surfaces should be cleaned of oxide and scale, and sufficient metal should be removed by grinding to insure the elimination of areas where carbide precipitation is heavy from the heat of cutting. Where excessive heat concentrations are avoided in the burning operation, the removal by grinding of ⅛ in. of material from the cut surface should be satisfactory. Sections impossible to grind may be cleaned of scale with an air or hand hammer and chisel.

Welding Procedure

The size of electrode to be used for the first two layers of weld metal over the "impact area" is worthy of consideration. Electrodes of ⅛ in. or 5/32 in. diameter, using suitable welding circuit amperage, will reduce materially the amount of heat which the parent metal is required to absorb, with a corresponding reduction in the area and amount of carbide precipitation. This method assures a minimum of disturbed structure beneath the weld, and the two or more layers as applied with small diameter electrodes constitute a protective pad of nickel-managanese steel weld metal to absorb the higher temperatures created by the larger electrodes used for the major portion of the build-up work. The nickel content of the electrode metal inhibits the precipitation of carbides within the weld metal itself which, therefore, is not affected by the heat of additional layers. Suitable amperages for the application of various sizes of nickel-manganese electrodes are shown in the following table.

Beads deposited by ⅛-in. and 5/32-in. electrodes should be about ½ in. wide, while 3/16-in. and ¼-in. electrodes should deposit beads ¾ in. to 1 in. in width. The thickness of the bead should be limited to 3/16 in. in all cases. Individual beads should be terminated with the consumption of one-half of the usual 18-in. electrode. Bead craters should be filled to the height of the body of the bead before the arc is broken and each bead should be thoroughly peened, beginning at the filled crater and peening backward toward the starting point. Air or hand hammers may be used for this purpose, but peening must be thorough to relieve shrinkage stresses and to provide a denser material that is less susceptible to flow and deformation. It is advisable to plan the bead layout in each layer so that there will be no adjacent craters where accumulated stress may result in the development of cracks or checks.

Suitable Amperages for the Application of Various Sizes of Nickel-Manganese Electrodes

Diameter of rod	Bare rod, d. c. amperes	Coated rod d. c. amperes	Coated rod a. c. amperes
1/8 in.	80-100	75-90	80-100
5/32 in.	90-125	85-110	90-125
3/16 in.	110-150	100-130	110-150
1/4 in.	135-160	110-140	135-160

In the properly executed weld with planned bead distribution, there will be no excessive stress concentrations or localized overheating of the casting. The parent metal should be cleaned carefully with a wire brush before depositing each bead, because accumulations of oxide, bits of coating and other foreign material will interfere with proper penetration and complete fusion when electrodes are handled at the specified amperages. Lack of cleanliness often causes welders to use a greater amperage for the deposition of nickel-manganese steel electrodes than is required under better practice for good penetration and fusion.

Completing the Weld

Completed welds should be built up higher than the finished dimensions to permit the removal of all irregularities, and to provide a smooth, straight surface following the grinding operation. It is desirable to subject completed welds to the peening and leveling action of several trains before grinding them. This practice should be limited, however, for the higher points will quickly work-harden and the localized hardness so initiated may set up stresses which are never completely relieved. Sharp edges, where subjected to traffic, should be removed by grinding a radius on all such edges that will be followed by the wheel flanges. Where the gage side of the flange is involved, the radius should be about ⅝ in. This will permit a good portion of the anticipated flow to take place before a sharp edge is created, with the customary tendency to spalling that follows. Edges followed by the guard side of the flange are ordinarily protected adequately by providing a radius of ⅜ in.

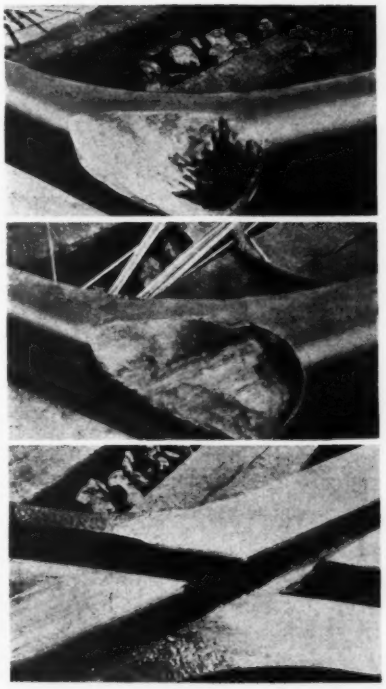
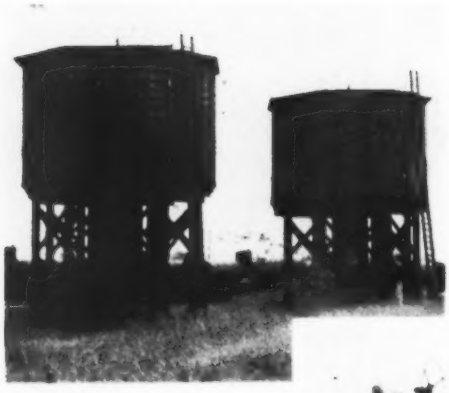


Fig. 5—(Top) A Deep Cut at a Frog Point to Remove Work-Hardened and Otherwise Defective Metal, Before Welding. Fig. 6—(Center) The Base of the Cavity Laid in With Nickel-Manganese Weld Beads on a Relatively Horizontal Plane. Fig. 7—(Bottom) The Frog Point, Completely Rebuilt and Surface Ground

Welding of manganese steel trackwork during extremely cold weather should be preceded by a slight preheat, limited to 200 deg. F., which will usually prevent the tendency to cracking in both parent and weld metal found upon the application of welds to manganese castings at 0 deg. F. or lower.

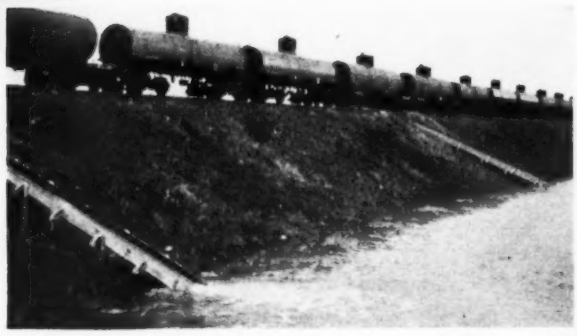
Reclamation welding of manganese steel trackwork units is in no sense comparable to the predetermined setup of production fabrication. Each frog or crossing must be considered as an individual job with peculiarities of its own. It is often disastrous to hurry with this type of work, because irreparable damage can be done by overheating. Experience, based upon an accurate record of costs and service obtained, should be the deciding factor in determining whether the individual unit should be welded in track, taken out of service for the welding operation, or scrapped as definitely not economical to weld. The cost of such a record is a minor item compared with the saving that can be accomplished through its use.



Hauls Water for
In Overcoming

Faced with a dwindling municipal water supply from which it draws its requirements at Centralia, Ill., the water service department of the Illinois Central co-operated actively with the city for almost two years to obtain water from every available source. When its supply was cut off, water haulage was organized in such a way that 450,000 gal. were handled daily for two months at a cost of only $0.40 per thousand gallons. This article describes the measures that were taken at this point

Above — The Two 100,000-Gal. Service Tanks at Duquoin, Ill. Right—The Tank Cars Were Loaded Through 12-In. Water Columns, Extended in Height for That Purpose



Right — Unloading the Water Train at Centralia After It Was Spotted Over the Unloading Trough

FAILURE of the city water supply at Centralia, Ill., from which the Illinois Central normally draws its requirements, as a result of the severest and longest-continued drought in many years, created an emergency which compelled this road to haul 450,000 gal. of water a day for a period of approximately two months. That this was done at a cost of only $0.40 per thousand gallons reflects the manner in which the project was organized and carried out during the period of the emergency.

Centralia is an important terminal on the line between Chicago and New Orleans, and is also the junction with the line extending to Freeport, Ill., and Dubuque, Iowa. The facilities include a large hump yard, an engine terminal and a shop of considerable size. Coal from the Franklin, Williamson and Marion County districts is brought to Centralia, from which point it moves to Chicago and points in Central Illinois, Wisconsin, Iowa and Minnesota. In addition, there is a large north and south movement of other commodities.

In 1937, rainfall in Southern Illinois was well above normal, so that both railway and municipal reservoirs were filled to overflowing. Since that date, however, there has been a marked deficiency in precipitation over this section of the state, which has grown progressively worse year by year, until by early summer of 1941, streams had dried up or were at record low stages and impounded supplies were so depleted that severe restrictions on water usage became necessary.

From the beginning of its operation until 1893, the railway maintained its own water facilities on Crooked creek, a small stream of reliable flow about two miles north of Centralia. At that time the city, desiring to have a municipal supply, took over the dam and other facilities which the railway had maintained and, in addition, constructed a 50,000,000-gal. reservoir in a small valley about 1½ miles farther north, at the same time contracting to provide the railway water.

New Supply Necessary

This supply was adequate until 1908, by which time the increased consumption by both the city and the railway, combined with a severe drought, made it necessary for the railway to haul water to meet its needs. The only adequate supply then available for this purpose was at Grand Tower, Ill., on the Mississippi river, about 80 miles distant, which could be reached only by a circuitous route. This was a costly operation and as a result of this experience and severe shortages at other water stations, the Illinois Central undertook a program of water-supply development that has solved most of its water problems in Southern Illinois. In fact, even during the present severe and almost unprecedented drought, all of its own supplies that were developed under this program have been ample to meet all demands, the only shortages having been where it has depended on municipal supplies.

On its part, the city recognized the need for a larger supply to meet the growing consumption, with a sufficient reserve to carry it over periods of drought which recur rather frequently in this area of the state. To meet these

40 Cents per 1,000 Gal.

Serious Shortage

requirements, a reservoir, known as Lake Centralia, having a capacity of 1,080,000,000 gal., was constructed about nine miles east of the city. On the basis of the consumption at that time this supply was sufficient for two years, even with no inflow, in addition to which the old or north reservoir and the facilities at Crooked creek were retained, except that the pumps had been removed after the new reservoir was built.

Flow Ceased Entirely

Partly by reason of natural growth and partly through influx as a result of an oil field development in this area, the population had more than doubled by 1940. This created a greatly increased draft on the reservoir, with a corresponding reduction in the margin of safety. This situation was still further aggravated by the fact that the drainage area serving the reservoir comprised only 4,500 acres, so that the inflow during 1940 was little more than enough to offset evaporation, while it ceased early in the spring of 1941.

Pumps Were Loaned

The impending shortage was foreseen as early as March, 1940, at which time the Illinois Central loaned pumps to the city to enable it to pump water from Crooked creek to reduce the draft on the reservoir. This was an intermittent supply, however, partly because of lack of rainfall and partly by reason of frequent salt contamination from the oil wells in the vicinity. As a further means of preventing, or at least delaying, a complete water failure, early in 1941 the city constructed a temporary dam across Raccoon creek, about 1½ miles south of the main reservoir, and laid a permanent 24-in. pipe line to the city waterworks. Temporary pumps, also loaned by the railway, were installed and operated when water was available.

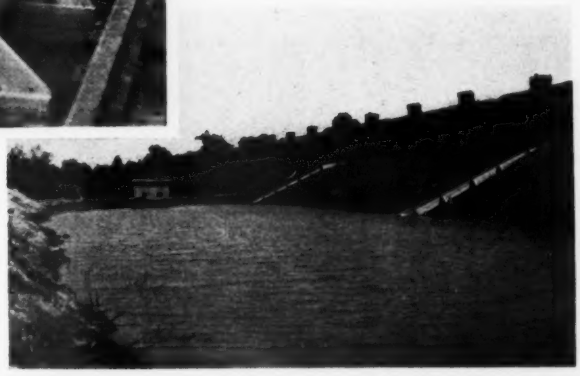
Despite these measures, and the exceedingly severe restrictions that were placed on water consumption, the water receded until it stood 19.6 ft. below the crest of the spillway and only 125,000,000 gal. remained in the reservoir. To this, however, should be added the 40,000,000 gal. remaining in the old or north reservoir, which had not yet been drawn on. To boost this latter supply, more pumps were loaned to the city and installed on Turkey creek to pump such water as was available into this reservoir. Other pumps were also placed at Crooked creek some distance below the dam. Late in August, 1941, the situation became so acute that it became necessary to cut off the two railroads (the Chicago, Burlington & Quincy was also obtaining water from the city), and the Illinois Central began to haul water to Centralia on September 1.

Left—Water Draining Into the Trough from Open Valve Underneath One of the Tank Cars

Right—The Trough Was Built of Timber and Lined with Prepared Roofing

Preparing to Haul Water

Preparation for doing this had been under way for some time, however, since the eventual necessity for doing so had been apparent for months. As the first preliminary, a dragline was employed to excavate a basin 300 ft. long and 50 ft. wide, having a capacity of 2,000,000 gal., alongside a



Right—The Unloading Basin at Centralia Had a Capacity of 2,000,000 Gal.

track that could be used for unloading the water train, in the area between the north and southbound yards. Temporary electric-driven pumps were installed at the north end of this reservoir and an 8-in. line was laid to connect with the supply line serving the three 100,000-gal. storage tanks that serve the Centralia terminal. At the same time, a wood unloading trough, similar to a track pan, was constructed in the center of the unloading track, which was raised enough to pitch it both ways toward the center. This trough was 24 in. wide, 6 in. deep and 2,100 ft. long, and was lined with prepared roofing to prevent leakage. The water was discharged from the trough into the basin through two lateral troughs of the same dimensions.

One of the impounded supplies which the Illinois Central constructed after the drought of 1908, is known as Cherry lake, at Duquoin, 36 miles south of Centralia. While this lake contained a large surplus of water, so far as local consumption was concerned, it was not considered wise to draw on it too heavily, to care for the requirements at Centralia. However, Duquoin has a municipal reservoir of large capacity and arrangements were made with the city to supply the bulk of the water needed.

Water storage at Duquoin consists of two 100,000-gal. tanks, and to facilitate delivery of water by the city an 8-in. connection was laid from the storage tanks to the city's 10-in. raw-water line. This enabled both the city and the railway to pump into the tanks simultaneously. Locomotives take water at Duquoin through 12-in. water columns, one of which is located between the northbound main track and a passing siding. As the tank cars are considerably higher than the locomotive tenders, material was assembled to raise this water column enough to clear the tank-car domes and permit the water to be delivered directly through the water column.

Loading the Water Train

In further preparation, 100 tank cars, ranging from 6,500 to 10,000 gal. in capacity, were assembled for the water train. After the train was placed in operation it was found, however, that 60 cars would be enough, and 40 were released. The water train was put on a regular schedule, beginning with its initial run on September 1, 1941, and was handled by the same locomotive and train crews during the time it was in service. The train was scheduled to leave Centralia at 6:30 a.m. daily, and as soon as it was dispatched the city and railway pumping stations at Duquoin were notified that it was on the way, to insure that the two tanks would be filled upon arrival.

Two men were detailed from the water-service department to supervise the loading and to keep the delivery equipment in order, so that there would be no delay in filling the tank cars. Also, to insure against draining the storage tanks, as soon as the train was spotted for loading, the pumping stations were again notified, and they pumped continuously until the last tank was filled. Since it was necessary for the water train to intrude upon the main track, interruptions occurred from time to time to permit trains to go by, but where no interruptions occurred, it was possible to load the train in three hours.

Upon arrival of the water train at Centralia, the cars were spotted over the unloading trough and the crews were released. The water was then discharged through the valves on the underside of the cars into the unloading trough. This operation required about five hours, this time being necessary to avoid overflowing the trough and thus wasting the water.

The water brought in by train was used exclusively for locomotive supply. To avoid contaminating the water in the city's mains, the city line that had been serving the three storage tanks was disconnected when the connection was made to the temporary pumps at the unloading basin. However, the city continued to supply water to the shop and yard for drinking and sanitary purposes. The volume of water brought into Centralia by the train was slightly more than the daily requirements and, as the margin of supply in the unloading basin increased, it became unnecessary to operate the water train daily the latter part of the period of haulage.

Cost Was Low

Not the least interesting phase of the whole operation was the cost of the emergency supply. Each train hauled 450,000 gal. of water from Duquoin, part of which was purchased from the city and part of which was obtained from the company's reservoir at Cherry lake. The average cost of this water in the storage tanks was $0.10 per thousand gallons. The overall cost for each train load of the water, unloaded at Centralia and pumped into the storage tanks, including the original cost of the water at Duquoin, was as follows:

Water, 450,000 gal. @ 10c	$ 45.00
Train operation	48.98
Rental—60 tank cars	60.00
Loading	9.60
Unloading and pumping	11.55
Current for pumps	4.00
Total	$179.13

It will be noted that, reduced to unit cost, this amounts to $0.40 per thousand gallons.

Rains began early in October and during the month precipitation was well above normal over the entire area involved in both the permanent and temporary sources of the city's supply. By October 20, the water in Lake Centralia had risen 6 ft. and the inflow was continuing. In addition all of the streams that have been mentioned were flowing full, and it was considered safe to resume delivery to the Illinois Central from the city supply, and the water train was discontinued on that date.

To increase its water reserves and thus avoid the possibility of a similar shortage in the future, the city has purchased sufficient land for an additional reservoir on Raccoon creek and is now constructing a permanent dam on the site of the temporary dam that served during the emergency. It was as a part of this project that the 24-in. pipe line that was mentioned was installed. With the completion of the new reservoir, which will have a capacity of 3,600,000,000 gal., the city will have a water reserve that will carry over any drought that is likely to occur, and the necessity for the railway again to haul water will be avoided for many years to come.

What Lies Ahead? Toil, Toil, Toil

(Continued from page 95)

debris; and most important of all, have men who do not become discouraged or disheartened.

After the War?

What lies ahead? When the rush of war is over, when quiet and peace again reign, then it will be all the more necessary to be prepared. Then, railroad traffic will diminish, competition from other forms of transportation will be more severe than ever before, and we who make up the railroad world will have a stupendous task to keep alive. What lies ahead? Toil, toil, more toil. Thought and ingenuity, courage and determination, loyalty and unselfishness—only by these can we succeed—only through these may we survive.

What lies ahead? The greatest challenge that has yet been presented to railway men. How we conduct ourselves and the extent to which we are courageous and loyal may provide the answer to the future of the railways of this country.

Kinked Track on Nor. Sou. Causes Freight Derailment

ACCORDING to a report issued by the Interstate Commerce Commission, the derailment of the freight train on the Norfolk Southern, near Oakboro, N. C., on the early afternoon of September 24, 1941, resulting in the death of the engineer and front brakeman and the injury of the fireman, was caused by kinked track. At the investigation held by the Commission, some doubt was expressed as to the immediate cause of the kinked track condition found, but it was brought out that the point of derailment was on the lower part of a grade rising out of a broad sag; that the track was not heavily ballasted; that the rail was not anchored with anti-creepers; that a few joints about 200 ft. ahead of the point of derailment had been tamped up a few hours prior to the accident; and that the temperature at the time of the accident was, in all probability, higher than 90 deg. F.

On Curve and Grade

The accident occurred on the Western district of the road, in single-track territory, at a point 4.5 miles north of Oakboro, N. C. The train involved, consisting of a locomotive and tender, 16 loaded and 4 empty cars and a caboose, was moving northbound at approximately 25 m.p.h., the permissible speed in this territory, when it was derailed, at about 1:25 p.m. Examination of the equipment after the accident showed that the engine was in good mechanical condition at the time of the accident, and there were no evidences of dragging equipment or of any obstruction having been on the track.

Approaching the point of accident from the south there is a section of tangent track 2,325 ft. in length, followed by a 4-deg. curve to the right, which extends 669.5 ft. to the point of accident and 224.5 ft. beyond. The grade for northbound trains is, successively, 1.1 to 1.29 per cent descending 4,000 ft.; level 3,500 ft.; and then 1.1 to 1.3 per cent ascending 1,685 ft. to the point of accident and 2,500 ft. beyond.

Immediately south of the point of accident, the track is in a cut, the east embankment of which makes it impossible for the engineman of a northbound train to see the point of accident until he is within 350 ft. of it. Because of the curve involved, the point of accident cannot be seen at all from the left side of the locomotive. About 111 ft. north of the point of accident is the near slope of a ravine which, at the time of the accident, was spanned by a 15-bent wood trestle 213 ft. long.

On the curve involved in the accident, the track structure consists of 100-lb. relay rail, 33 ft. in length, laid in 1936 on an average of 20 ties to the rail length. It is fully tie plated with single-shoulder canted tie plates; is single-spiked; and is equipped with four-hole continuous angle bars, 24 in. long. No rail anchors are used.

The track is ballasted with sand and gravel to a depth of six to eight inches, with ballast filling the cribs to about half their depth and extending about five inches beyond the ends of the ties. The maximum superelevation on the curve at the time of the accident was 3¼ in., and the gage varied between 4 ft. 8¼ in. and 4 ft. 9 in. At the point of derailment, the superelevation was 3½ in. and the gage was 4 ft. 8¾ in.

Reverse Kink

Prior to the time of the accident, according to the Commission's report, a section of track 191 ft. long within the curve involved had been displaced. Northward from a point 585.5 ft. north of the south end of the curve, the track was displaced throughout a distance of 66 ft., a maximum of 17 in. to the east of the normal center line. Immediately north of this section, the track was displaced to the west throughout a distance of 125 ft., a maximum of 32 in. west of the normal center line. The maximum curvature of the two displaced sections was approximately 12 deg. The derailment occurred at a point 18 ft. north of the south end of the second displaced section, at which point the displacement was 9 in. west of the normal center line.

Following the derailment of the engine truck, the engine continued forward to the south abutment of the trestle, a distance of 111 ft., and then over the trestle to the north abutment, a distance of 213 ft., where it, the tender and first eight cars overturned to the right. The track was destroyed from a point 45 ft. north of the point of derailment to the south end of the trestle, a distance of 66 ft., and the trestle was practically demolished.

The exact time that the kinked condition in the track occurred is not known. According to the evidence the last train to pass the point of derailment prior to the derailment was a northbound train, which passed about 8 a.m., or about 5 hr. and 25 min. prior to the time the accident occurred. The engineer of this train had been in charge of the engine of a southbound train which passed over this track the evening of the previous day. At that time he observed that the track appeared to be slightly out of alinement at a point about 220 ft. south of the point where the accident occurred. However, he did not consider the irregularity serious enough to be reported.

The morning of the day the accident occurred he again observed the irregularity in the track at this location, and, about 8:30 a.m., when his train arrived at Norwood, N.C., about eight miles north of the point of accident, he reported the condition to the section foreman. The section foreman proceeded immediately to the location involved and found three low joints in the track about 220 ft. south of the point where the accident occurred. Two joints in the east rail of the curve and one on the west rail were from ¼ in. to ⅜ in. low.

According to the testimony of the foreman, the joints were raised to the proper level and the ballast was tamped beneath the ties, but the track was not disturbed at more than 12 ties, all of which were within a distance of about 40 ft. The repairs were completed about 9:30 a.m.

No Previous Difficulty

Measurements taken by the section foreman disclosed that the superelevation and gage throughout the length of the curve were in accordance with specifications. The track was out of alinement only about 1/16 in., which the foreman did not consider unsafe for train operation, and he observed no indication of tight joints or creeping track. Furthermore, according to the section foreman, there had been no unusual displacement of the track structure in the vicinity of the accident during the 10 months immediately preceding that he had been on this territory.

The track supervisor in charge of the territory stated that about one year prior to the accident, the curve involved had been realined to stakes, and that at that time it had been

found necessary to cut some of the rail to permit realinement to the degree of curvature desired. In his opinion, the work performed on the track several hours prior to the accident did not contribute to the kinking of the track.

Prior to the day of the accident, he had observed no evidence of rail creepage on this curve. Rail anchors had not been used in this locality, and the track supervisor stated that their use might have prevented creeping of the rail. Other officers of the road testifying at the investigation considered the track structure safe and stated that they knew of no measures that could have been taken to prevent the displacement of the track.

Concluding its report, the Commission stated that since rail anchors were not used, and since it was found necessary a year prior to the accident to shorten the rail sufficiently to permit the track to be realined properly, it appears probable that the rail gradually crept down the approaching grade from the south during the last year and caused the rail joints on the lower end of the upgrade where the accident occurred, to be compressed; this condition, combined with high temperature, ballast that offered little resistance to lateral movement of the track, and track curvature, resulting in the track becoming kinked.

Relays 3.37 Track Miles of Rail a Day

(Continued from page 94)

tion gangs were combined and started at the other end. The surfacing was completed in 17 working days.

Laying Rail on the Chicago Terminal

The laying of rail on the southbound passenger main on the Chicago terminal was handled in a similar manner. Another meeting was held with the supervisors to determine the number of men that each supervisor would furnish, where they would be placed, etc. In the Chicago terminal of the Illinois Central, which has electrified suburban service, it is possible to get men to any location quickly, and, as in the rail laying on the Freeport district, most of the laborers consisted of regular section men. No flagmen were required on this work, since it was in multiple track territory and the track was "killed" for the rail laying operations.

On this work 171 men were used, including 148 laborers, 8 machine operators, 1 welder, 1 welder helper, 6 foremen, a signal foreman and 6 signalmen. This gang made even greater progress than was made on the Freeport district. This was due principally to the fact that there was no interference from traffic, and also to some extent to the fact that a larger gang was used. To offset this, however, this track had a large number of new hardwood ties, which made the spike pulling and driving a little harder than is ordinarily encountered in rail laying work.

Starting on the southbound passenger main at Harvey, Ill. (155th street) on Monday, October 20, the gang laid the east rail all day, beginning work at 6:30 a.m. The laying of the rail was stopped at 2:50 p.m. and the track was fully spiked and the men on the way home by 3:30 p.m. after laying 807 rails (3 track miles). Tuesday, the west rail was relaid. The gang began work at 6:30 a.m., 125 rails were laid in the first hour and 496 rails had been laid by 11 a.m. At 3:30 p.m., 910 rails (3.37 track miles) had been laid. The track was fully spiked and the men were on the way home by 4 p.m. On Wednesday, the gang relaid the east rail all day; the work commenced at 6:15 a.m. the first rail was down at 6:20 a.m. and 540 rails had been laid by 11 a.m. The gang arrived at the end of the new rail at 1:30 p.m., at which time 765 rails (2.83 track miles) had been laid. The track was fully spiked and other work was completed at 2 p.m. Thursday, work was started on the west rail at 6:30 a.m.; 516 rails were laid by 11 a.m., and the last rail was laid at 1:10 p.m. The track was fully spiked and the men were gone at 1:30 p.m. The total number of rails laid that day was 672 (2.50 track miles).

In detail, the organization of this gang and their operations were as follows:

1 man pulled joint spikes
1 man removed rail anchors
1 man cut bond wires
1 man with a push car distributed tie plugs
2 operators with bolting machines removed the nuts on the track bolts
2 men assisted the bolting machine operators
1 welder and 1 welder helper burned off frozen track bolts left by the bolting machines
9 men with three spike pullers (3 to each unit) pulled spikes
1 man with a sledge removed the old angle bars and bolts
6 men pulled track spikes with claw bars
4 men threw out the old rail
3 men cleared the track of old tie plates and spikes
4 men set tie plugs
1 man drove down spike stubs
3 men with plug drivers drove down the tie plugs
2 foremen
1 water man
3 machine operators with 3 adzers
4 men operated two creosote sprayer machines, applying creosote on the adzed surfaces of the ties
1 man filled the sprayer machines
6 men placed tie plates
1 rail crane operator
4 men set in the new rail with the rail crane and placed shims
1 machine operator on a push car pulled by the rail crane sharpened adzing bits
1 foreman
3 men put on angle bars
1 man put on insulated joints
3 men straightened tie plates
2 machine operators and two helpers with bolt tightening machines tightened the track bolts
3 men with a push car distributed spikes
1 water man
14 men with gages spiked the track to gage at every fifth tie
7 men nipped ties for the gagers
1 foreman
10 men set track spikes for the spike drivers
14 men spiking
1 foreman
6 men with pneumatic spike drivers
4 men nipped for the spikers
4 men pushed two compressors
4 men reset bent spikes
3 men with a push car distributed rail anchors
1 machine operator with motor car
1 foreman
6 men applied rail anchors
7 men smoothed track
1 water man
1 signal foreman
6 signal men

After the rail was laid, a slow order of sixty miles per hour for passenger trains with steam passenger engines, and fifty miles per hour for freight trains was placed in effect with no speed restrictions for Diesel-powered streamlined trains.

The second day of the rail laying operations, a work train with two small crawler cranes mounted on flat cars started loading the old rail. The loading of old rail, angle bars and fastenings was completed and the material shipped the day after the laying of the rail had been completed.

The morning after the completion of the rail relay, two extra gangs commenced surfacing the track, one gang working south and the other working north from the ends of the relay. One gang was equipped with a power ballaster and the other was furnished with electric tamping machines. The 11.70 miles of track were surfaced in eight working days. The track was given an average lift of 2½ in. on crushed slag.

This work was done entirely under the supervision of the Chicago Terminal division forces.

C. & O. Announces Annual Track Awards

IN accordance with a practice of long standing, the Chesapeake & Ohio has made cash awards to track supervisors and foremen for excellence in track maintenance in 1941. In arriving at the ratings on which these awards were based, records provided by the operation of a special inspection car during March and July, 1941, were combined with similar records obtained in the annual maintenance of way inspection which was conducted from a special train in November. Thus the ratings are based on conditions existing throughout the year rather than at the particular time of operating the annual inspection train.

In order that the different territories may be judged on a comparative basis, they were divided into five groups according to the character of the track and the class of traffic handled. The groups are as follows: Group 1—double-track main lines, freight and passenger traffic; Group 2—single and double-track main lines, principally freight traffic; Group 3—single track main lines, principally passenger traffic; Group 4—secondary branch lines; and Group 5—yard and terminal territories.

In Groups 1 and 2, prizes of $50, $40 and $30 were awarded to the supervisors in each group receiving the first, second and third highest ratings, respectively, while in Groups 3, 4 and 5 prizes were awarded in each group for the first and second highest ratings, respectively. In addition a prize of $50 was awarded to each of two supervisors—one in Groups 1 and 2 and the other in Groups 3, 4 and 5—whose territories evidenced the greatest improvement as compared with the previous year. Awards to foremen consisted of cash prizes of $25 and $15 for the best and second-best maintained section on each supervisor's territory.

The names of the winning supervisors are as follows:

Group 1—First prize—J. H. Poindexter, Peninsula district, Richmond division; Second prize—C. E. Butcher, Cincinnati district, Cincinnati division; Third prize—W. P. Nichols, Ohio River district, Cincinnati division.

Group 2—First prize—H. S. Chandler, Rivanna district, Richmond division; Second prize, J. F. Painter, James River district, Clifton Forge division; Third prize—O. C. Ewers, Paintsville district, Ashland division.

Group 3—First prize—G. E. Bostic, Mountain district, Clifton Forge division; Second prize—C. L. Crummett, Piedmont district, Richmond division.

Group 4—First prize—G. C. Coyner, Loup Creek district, Hinton division; Second prize—R. B. Grier, Piney Creek district, Hinton division.

Group 5—First prize—F. B. Barrick (asst. division engineer), Russell division; Second prize—R. C. Bishop, Maunee district, Hocking division.

W. P. Nichols, third prize winner in Group 1, was also awarded the improvement prize for Groups 1 and 2, G. C. Coyner, first in Group 4, was awarded the improvement prize for Groups 3, 4 and 5.

Ernal McCann Breaks Track Records

PERFECTION in track maintenance is frequently considered an ideal which, regardless of how one may strive for it, is not possible of practical achievement. But not to Ernal McCann, section foreman. Twice in as many years, Mr. McCann's section on the Norfolk & Western has been given a perfect rating in the company's annual track inspection—and thereby he has established a record that is unique in the history of track inspection on his road.

Mr. McCann and His Four-Man Crew Pause To Have Their Picture Taken

His Record

When in 1940, Mr. McCann's section was given the rating of 9.50, the highest possible mark, he acquired the distinction of being the second foreman ever to achieve this perfect rating in the history of the railroad. It had been attained only once before, and that had been 35 years previously. When Mr. McCann's territory was again awarded the perfect rating in 1941* it meant that he had established an entirely new record—he became the only foreman ever to achieve the perfect mark twice. But this is not all. In 1936, Mr. McCann's section was rated at 9.49, and in both 1938 and 1939, the rating was 9.48.

In short, here is a foreman with whom perfection in track maintenance has become something of a habit. How does he do it? To what does he attribute his success? Does he employ any particular "formula" in carrying out his work?

First, let's glance at his background. Now 43 years old, Mr. McCann first entered the service of the N. & W. in May, 1920, as a section laborer at Rarden, Ohio. In 1926, he was promoted to relief and extra-gang foreman on the Scioto division, and on April 1, 1931, he was further advanced to section foreman at Sardinia, Ohio, which position he still holds. His section at Sardinia embraces seven miles of single main track, about two miles of sidings, 16 switches, three bridges, 23 public and

*See the January, 1942, issue, page 39, for the results of the 1941 track inspections.

private crossings, two acres of station grounds and 8,500 ft. of ditches. Besides himself, there are four men in his gang, all of whom have had years of experience in track maintenance work.

A hard worker, who believes in careful and thoughtful planning, close attention to detail, and continuous, unremitting effort, Mr. McCann is reported to bring to his work a zealous desire to be satisfied with nothing short of the best job that it is within the power of himself and his men to do. But the final answer to his success may lie in a certain attitude that he has cultivated toward his work—an attitude that he endeavors to inculcate in his men. Speaking of this attitude, he says, "I only ask the men to do the kind of work they would be willing to pay someone else to do. In other words, we try to work as we would if we were paying the bill." After all, can one have any greater incentive to do a good job?

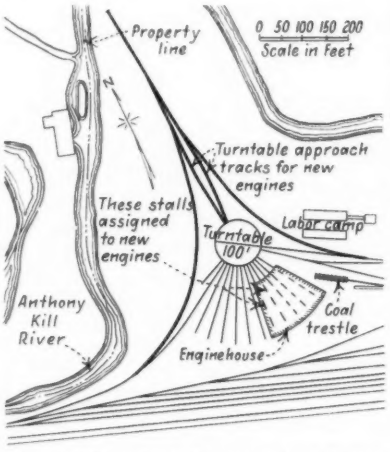
Novel Track Layout Obviates Necessity of New Turntable

TO make possible the handling of new and larger locomotives at a terminal where the existing turntable was too short for the new engines, an ingenious track arrangement was devised on the Delaware & Hudson, by means of which they are enabled to enter the enginehouse without the necessity of altering or renewing the turntable.

This road recently placed 20 new locomotives in service between Carbondale, Pa., and Mechanicville, N.Y. These locomotives are of the 4-6-6-4 type and have a wheel base of 103 ft. 6 in. Hence, they could not be handled by the existing turntable at Mechanicville, which is only 100 ft. long. This turntable, which serves a five-stall enginehouse, was originally of the balanced type, but subsequently it was converted into the three-point-support type.

Since the new locomotives are inspected and given running repairs at Mechanicville, it was necessary that they not only be turned at that point, but also that they have access to the enginehouse. The obvious way to solve the problem would have been to replace the existing turntable with a structure of the necessary length. However, it was desired to avoid the expenditure entailed by the installation of a new turntable, which was not justified at this time by the size and importance of the terminal, and a search was made for a less expensive solution to the problem.

It was then that the idea was conceived of using the existing turntable simply as a bridge for carrying the new engines across the pit to give them access to a limited number of stalls in the roundhouse. The turntable continues to function in the usual manner in turning the shorter locomotives, but when handling one of the new engines, it is lined up with one of the enginehouse tracks and held in that position to permit the engine to cross over. Obviously, for each stall assigned to the new engines it was necessary to install an approach track on the opposite side of the turntable to line up with that particular enginehouse track, and, in addition, it was necessary to provide a wye for turning the new locomotives.



Plan of the Enginehouse and Adjacent Tracks at Mechanicville. Heavy Lines Indicate Tracks That Were Installed to Give New Locomotives Access to the Enginehouse and to Turn Them.

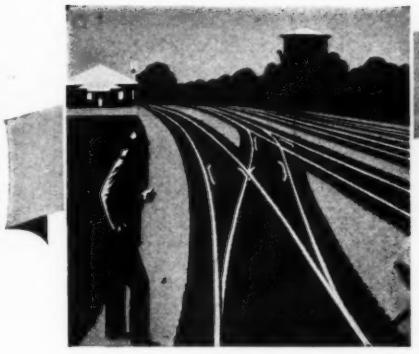
The engine terminal at Mechanicville is located on the north side of the company's main and yard tracks, the arrangement being such that the turntable is north of the enginehouse, or on the side opposite the tracks. The roundhouse is served by an inbound and an outbound track which approach the turntable from the east. On the south side of the enginehouse eight tracks radiate from the turntable, seven of which are stub-end storage tracks, while the eighth is an outbound track extending to a connection with the yard tracks west and south of the enginehouse.

It was decided to set aside the two most westerly stalls in the enginehouse for use by the new locomotives, which made it necessary to provide two approach tracks on the north side of the turntable directly in line with the tracks in the two stalls. It happens that in the vicinity of the enginehouse the railroad's property is bounded on the north by a stream which swings to the north in a sharp loop directly opposite the enginehouse. The area within the loop, which was not otherwise occupied, was sufficiently large to accommodate a tail track, and it was decided to install the necessary wye at this location, which at the same time would provide connections for the two approach tracks. The two legs of this wye lie on opposite sides of the turntable and enginehouse, with the easterly leg connecting with the inbound enginehouse track and the westerly leg connecting with the outbound track west of the enginehouse.

The two turntable-approach tracks for the new locomotives are located in the angle formed by the two legs of the wye, one of them being connected with the easterly leg and the other with the westerly leg. Light curves were introduced in these tracks in order that they would approach the turntable in a direction normal to the pit circle. With this track arrangement, an inbound locomotive is brought around the easterly leg of the wye and switched onto one of the approach tracks, depending on the stall in which it is desired to place it. The turntable is then brought into the proper alinement and the locomotive passes over it into the enginehouse.

Thus, by the construction of about 2,100 ft. of tracks, the railroad solved the problem of handling the new locomotives without installing a new turntable and without interfering with traffic over the existing turntable during the course of the work. As part of this project it was necessary to enlarge the two stalls that were assigned to the new locomotives, the engine pits in these stalls being lengthened 50 ft., and the stalls 30 ft.

The track arrangement described in this article was developed by P. O. Ferris, chief engineer of the Delaware & Hudson, and was installed under his general supervision.



WHAT'S the Answer?

Stimulating Competition

Is there any merit in the distribution of weekly or monthly statements of work done by the foremen of a district as a means of stimulating them to strive for records? Any disadvantages? Why?

Creates Active Interest

By M. D. Carothers
Division Engineer, Alton, Bloomington, Ill.

It creates active interest in the maintenance of way organization to have fixed schedules set up for the foremen to work to. For instance, we give all of our foremen a fixed allotments of ties to be renewed each month. If his schedule of ties is not completed by any foreman, he knows that the supervisor will expect an explanation as to why he was unable to complete his allotment while his neighboring foreman made his schedule. In this way the supervising officer knows at once which foremen are handling their men in the most efficient manner.

When laying rail, we give a number to each man in the spiking gang. The assistant foreman marks a number on the rail over each tie to be spiked. The spiking gangs then spike only where they find the numbers assigned to them. In this way we soon learn who the best spikers are, and those that finish first get a chance to rest until the others finish. This gives the men something to work for, and thus stimulates interest in their work.

Some disadvantages will develop, which must be overcome by the supervisor. It will be necessary to have it understood that the work must be done to the required standards. Any time that the work is slighted, the substandard workmanship will shortly be in evidence. The honor of these men in the competitive work should be on the same plane as for those competing in athletics. The work should be supervised according to rules and regultaions the same as in sports and should be graded with the utmost fairness. Records in maintenance of way work stimulate interest from the president down to the individuals who are competing.

Does Not Favor

By J. D. McSheffrey
Acting Roadmaster, Canadian Pacific, Prescott, Ont.

I have given this subject considerable thought and have reached the conclusion that little is gained by putting out such statements and that they may be costly in the end. Foremen can be divided into three classes: (1) the ambitious; (2) the scheming; and (3) the unambitious.

I am sure that the statements suggested in the question could be of real value to those in the first class, as they will spur them to do more and better work, since men in this class rarely sacrifice workmanship for volume of work. These periodical statements will be likely to offer an opportunity for further scheming by the foremen embraced by the second class, in the hope of fooling their superior officers into thinking that they were doing great things. To make a show of work, they sometimes run over the job, leaving the hidden work

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in April

1. What are the most important factors contributing to motor car accidents? What can be done to overcome them?

2. In view of the present marked expansion in maintenance activities, should carpenter gangs be expected to do both bridge and building work, or should these classes of work be assigned to separate gangs? Why?

3. Where section gangs are small, to what extent is it desirable to double them up to do lining and other work? What are the advantages and disadvantages?

4. Is it good practice to splice piles in a bent of a pile trestle? Why? If so, how many piles in the bent is it permissible to splice? How many bents may contain spliced piles?

5. What preparatory work should precede the installation of a highway crossing at grade? Does the type of crossing make any difference? The character or density of the highway traffic? Why?

6. What are the causes of leaks in water mains? How can they be detected? How repaired? How prevented?

7. Where power bolt tighteners are employed in laying rail, how soon after the rail is laid should the bolts be retightened? How many follow-up tightenings should be made? Why? Should this be done by hand or with power machines? Why?

8. Under what conditions and to what extent is it desirable to provide septic tanks at small stations? For company houses? What are the advantages? The disadvantages?

undone. In the end, of course, this will be disclosed, since it will be necessary to go over the work again. In the meantime, they will not only waste their own time and that of the gang, but in many cases a considerable amount of material will be destroyed by improper workmanship.

Statements of work done by others seldom make an impression on the unambitious foreman; in fact, it is doubtful whether some of them would give such statements sufficient study to really grasp their import. Even where they do read them, they dismiss them promptly from their minds as something for the other fellow to strive for. So far as this type is concerned, although some of them do excellent work, one would be out the paper and the effort necessary to gather and compile the information necessary to prepare and distribute the statements.

Defeats Its Own Purpose

By L. G. Mosher
Personnel Assistant, Maintenance of Way, New York, Chicago & St. Louis, Cleveland, Ohio.

The distribution of weekly or monthly statements of work done by the foremen of a district as a means of stimulating them to strive for records, has no merit and defeats the purpose for which it is intended. The compilation of weekly or monthly statements of work done by the foremen for the information of and interpretation by the supervisor, roadmaster or other officer does have merit. Such statements supplement the personal knowledge of the supervisor or roadmaster, and assist him in estimating the force required; they also provide a basis for determining satisfactory production.

Foremen are aware that the number of man-hours required to dig in ties, to surface track, to place concrete and to perform many other tasks, depends on various factors, such as the kind and depth of ballast, traffic conditions, weather and many others. For this reason, any statement that does not give due weight to these factors is valueless for comparisons between gangs. If such statements are used for performance charts or as accurate measures of maintenance or construction, the foremen will either sacrifice good work and safety for speed or they will disregard the comparisons on the ground that the entire setup is unfair. Any practice that plays one man or gang against another on an arbitrary basis usually results in breaking down the morale of the organization.

Supervisors and roadmasters should place dependence on their ability to judge good work and to make their men perform. Give the supervisors adequate guidance and support, with statistics to be used as their judgment and the circumstances dictate, and there will be no occasion to introduce a system based on piecework principles, for which there is no need and which is not adapted to the general run of railway maintenance.

What Size Ballast?

The A. R. E. A. specifications for both stone and blast-furnace slag ballast allow four groupings, namely, 1 in. to 2 in., ½ in. to 1 in., ¾ in. to 1½ in. and ¾ in. to 2½ in. In view of the refinements in line and surface demanded by high-speed trains, toward which limit should the preponderance of the sizes run? Why? Does this differ between stone and slag? Does the kind of stone make any difference?

Must Be Tough

By K. C. Saunders
Ballast Inspector, Chesapeake & Ohio, Columbus, Ohio.

In general, the past practice of giving the track a lift of six or more inches when surfacing out of face has increased the depth of ballast below the ties to such an extent that in most instances light lifts of 1 to 1½ in. are now sufficient. My observation indicates that it is for this reason that there is a trend toward the use of ballast smaller than 2 in. on many roads.

In view of the increased speeds of today and the more intensive traffic, it is quite obvious that more emphasis than formerly will be placed on line and surface. For this reason the gradation of the material to be employed as ballast is of great importance. When the ballast is very large and not well proportioned, severe tamping must be employed to reduce its size to fit the desired raise, provided this is less than the dimensions of the ballast. Ballast can be crushed to the desired size more cheaply at the quarry site than by any section force engaged in tamping ties. While the top size should be sufficiently large for greater lifts, for those will become necessary even in spot surfacing at intervals, approximately 50 per cent of the material should be of smaller size for light surfacing.

For all-around purposes, ballast, whether of stone or slag, is suggested, which will pass a 2-in. square opening, with 35 to 75 per cent passing a 1½-in. sieve, and not more than 5 per cent passing a ¾-in. sieve. This is similar to the A.R.E.A. specification No. 3. Pieces smaller than ¾ in. are not considered essential, since the ballast is angular and this compensates for the binder by providing a locking action to retard movement of the ballast and the shifting of the ties. In any ballast, the percentage of the fines may be decreased as the size of the crushed particles is increased, since fine material, that is, screenings and dust, prevents thorough drainage and thus serves only to foul the ballast.

Increased traffic, heavier rail and frequent tamping require that the ballast be tough and of sufficient hardness to withstand the heavy impacts to which it is subjected by the mechanical actions of tamping and load carrying. Ballast which can pass the toughness and Deval abrasion tests, or the more destructive Los Angeles rattler test, which reveals ability to resist both abrasive action and impact, should be amply durable for service.

Unless ballast consisting of sealed coated aggregates is employed, at least 90 per cent of the pieces should be of sound quality, that is, able to resist disintegration through weathering. The action of alternate freezing and thawing on ballast consisting of clayey, shaly or soft-cherty materials, often results in slaking which, in turn, serves to disrupt the much desired even-bearing beneath the ties and simultaneous clogging of the voids and thus contributes to subsequent pumping of the track. The accelerated sodium-sulphate soundness test is quite satisfactory for determining in advance what the relative behavior of ballast will be when exposed to the elements.

The kind of stone should be given definite consideration, since the quality of the ballast should be in accordance with the functions for which it is intended. Careful selection as to

the sizing and physical qualities of the ballast should aid materially in maintaining those refinements in line and surface that are so vital to the dense, high-speed traffic of today.

Prefers 3-4 to 1 1-2 In.

By W. Woolsey

Section Foreman, Illinois Central, Chicago

No ballast is superior to stone for high-speed or dense, heavy traffic, provided it is hard, tough and clean; none can be worse if it is soft or friable, or does not weather well. Stone makes a solid foundation for the track, it drains quickly, if clean, and vegetation does not grow in it readily. To maintain line and surface to the standards demanded by the speeds of today, I prefer stone ranging in size from ¾ in. to 1½ in. I find that stone of this size will hold the line better than either the larger or smaller sizes. Apparently the interlocking of the pieces is better, while the grip on the tie is somewhat firmer.

Large ballast often does not have as large a percentage of medium sizes as is required for stability and even when this percentage is reasonably high, the pieces do not interlock, and exhibit a tendency to roll. Any ballast that rolls will not hold the track in line or surface as well as stone that does not move in this manner. Another advantage possessed by the smaller stone is that the track can be maintained at less cost, for it is not necessary to work it as often, while the stone can be handled more easily.

Obviously the kind of stone makes a material difference in the quality of the ballast, but I fail to see why it should make any difference with respect to the preferred size, assuming that the quality of the various stones under consideration is such that they are satisfactory for ballast. In some respects furnace slag of the same size mentioned as preferable for stone, makes better ballast than stone, because it breaks with sharper edges and tends to interlock and grip the ties better than the stone.

Packing Hydrant Pits

Is it good practice to pack hydrant pits with sawdust or other material to prevent freezing? If so, how should this be done? If not, why? What other methods can be employed?

Sawdust Is Not Suitable

By J. H. Davidson

Water Engineer, Missouri-Kansas-Texas, Parsons, Kan.

Sawdust and other packing materials are used extensively around pipe lines, valves and fittings above ground, as protection against freezing. It is important that such packing material be enclosed in a suitable housing so that it does not become saturated with moisture, which greatly impairs its insulating value. On the other hand, sawdust and similar packing materials are not suitable for use in hydrant pits and should not be used for such purposes.

Hydrants are usually placed in pits either to remove the hazard of personal injury in areas where men have to work and move about; to provide unobstructed traffic lanes; or to protect the hydrants against freezing and to provide suitable drainage for them. There are many types of self-draining non-freezing hydrants on the market and others can be assembled from standard valves and fittings for installation in pits. When installed correctly, adequate drainage and excellent protection against freezing are obtained.

The pit should be constructed carefully, preferably with walls of brick, concrete or tile. It should be provided with one or more frost-proof partitions, between the top outlet and the valve mechanism in the bottom. These partitions should be removable, but should fit snugly so as to provide dead air space between them. Positive drainage is also important. Such installations usually afford sufficient protection against freezing and are easily accessible for repair men and other maintenance purposes. It can readily be seen that the packing of a pit with sawdust will interfere with drainage and complicate repairs and maintenance.

There are also suitable types of self-draining non-freezing high-top hydrants that can be installed directly in the ground. In places where these high-top hydrants do not present personal-injury hazards or obstruct traffic, they are satisfactory.

In the construction of hydrant pits for supplying drinking water to passenger equipment, it is necessary to take into consideration the United States Public Health Service regulations concerning such installations, as well as operating convenience and protection against freezing.

Is Poor Practice

By E. M. Grime

Engineer of Water Service, Northern Pacific, St. Paul, Minn.

Although it is sometimes done, I consider it poor practice to pack a hydrant pit with sawdust or other material to prevent freezing. The pit has been provided to permit access to the valve in case anything goes wrong with it, such as a leak. If the pit is filled with sawdust, either the leak is not discovered until spring when the sawdust is removed, or water rising in the sawdust may cause a large part of it to become frozen into a solid mass that is very difficult to remove to make repairs.

Sawdust is a good insulating material, but there is considerable labor involved in hauling it to the site, in packing it into place and then, after the danger of frost has passed, in removing it from the pit and hauling it away. A much better arrangement is to maintain the hydrant pit in good condition and to provide, below the cover, a tight-fitting frost deck made of double matched-and-dressed lumber 1 in. thick, with tarred felt between the two thicknesses of the lumber. This frost deck should be placed 12 to 18 in. below the cover. In exceptionally bad or exposed situations, a second frost deck may be desirable. Such a frost deck may be made in two halves and fastened to the pit walls with hinges, so that if frequent access becomes necessary, the frost decking can be hooked back against the side walls in the clear of men entering the pit.

If the pit curbing is built of concrete, wooden cleats are set into the walls at suitable height for the frost-deck construction. It is also considered advisable to leave the bottom of the pit open to the soil to take advantage of what heat is available from the ground below the frost line.

Should Not Need Packing

By K. J. Weir

Special Water Inspector, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Hydrants for water-service requirements on the railways are used primarily for fire protection, for watering coaches and for stockyard service. In most instances these hydrants, al-

though of many types, have one feature in common, that is, the vertical column of the hydrant is self draining. When the hydrant valves are closed, this column is, of course, filled with water. The construction is such that, with the closure of the valve, this column is able to drain to either a subsurface drainage system or the subsoil if no drainage system has been provided. The feeder pipe lines to the hydrant normally are placed below the frost line and the bottom of the pit is below the level of the supply line.

Sawdust, or any other insulating material which depends on air voids between particles for its insulating properties, is not suitable for use in packing hydrant pits where the hydrants drain to subsoil, for the water discharged from the hydrant when it is draining soon fills the air voids or saturates the material itself to such an extent that freezing results. With a suitable frost cover on the pit to prevent infiltration of cold air from above, and with the supply pipe lines and hydrant valves below the frost line, there should be sufficient warmth from the soil below the frost line to prevent freezing. Likewise, packing material that may be used to insulate hydrants that empty directly to a drainage system, will eventually become useless, because it will absorb moisture from condensation in the pit and become saturated sooner or later.

Proper construction of surface pit covers and below-surface frost covers is most important to prevent cold air from entering the pits. When this has been done correctly, there should be no necessity for additional protection. There are some places where it is not possible to use self-draining hydrants, however. In such cases, where freezing temperatures prevail for several months every winter, some protection must be provided. Steam coils in the hydrant pits have been used successfully for this purpose.

Should Never Be Done

By Supervisor of Water Service

While sawdust is still used all too frequently to protect hydrant pits from freezing during extremely low temperatures, the practice is an inheritance from an earlier day and is one that should be eliminated. In fact, it is only a makeshift, as it always has been, to care for a situation that should not have existed.

Hydrant pits have two primary purposes—to permit easy access to facilitate repairs or to get the hydrant below ground where it will not interfere with other operations or present hazards of personal injury. A hydrant pit that has been packed with sawdust completely defeats the first purpose, although the packing will have no bearing on the second one. If repairs to the hydrant become necessary it will then be necessary to remove the sawdust before the repairman can gain access to the defect, which is usually a leak. If the sawdust has become wet, which may occur by reason of leaks, from the normal drainage of the hydrant or from condensation in the pit, it may be partly frozen by the time the repairs are made and it is to be shoveled back into the pit. In such an event, which I have seen happen more than once, the sawdust will not only have lost its insulating value, but it will present a direct hazard of freezing the hydrant, all parts of which, together with the pit, have become chilled during the period it was necessary to keep it open to carry on the work.

Further than this, it is not so much the sawdust or other material itself that provides the insulation, but the minute pockets of air that are trapped, and which have no opportunity to circulate. Any material packed into a hydrant pit soon becomes wet and the entrapped air is either forced out when the point of saturation is reached or itself becomes saturated. In either event the material has lost its insulating value. Incidentally, this is the reason why such precautions are taken to prevent access of moisture to building insulation.

Practically every type of hydrant on the market can be obtained in self-draining non-freezing designs so that there is no excuse for a hydrant that in itself presents a hazard of freezing. Experience has shown definitely that frost-proof hydrant pits can be constructed and, usually, it is not difficult to provide the necessary outlet drainage. This being so, there remains no satisfactory excuse for packing hydrant pits. In extreme cases an electric light installed in the pit has been used to provide the small amount of heat that has been necessary to prevent freezing during exceptionally low temperatures.

Insulating Enginehouse Roofs

Should the roofs of enginehouses be insulated? Why?

Of Material Benefit

By L. C. Winkelhaus
Architectural Engineer, Chicago & North Western, Chicago

Most enginehouse roofs are of wood, consisting of 2 or 3-in. sheathing laid on purlins which, in turn, rest on timber girders. Insulation of such a roof structure would be of material benefit, not so much for preventing heat losses as for reducing the amount of condensation on the underside of the sheathing. A roof that is not insulated presents a cold surface that collects moisture when steam escapes in the enginehouse. While this occurs at all times except during the summer, it is especially troublesome during the low temperatures of winter. The timber absorbs this moisture, which contains considerable sulphuric acid from the engine fumes which are always present in enginehouses. This acid-laden moisture is very injurious to the timber and hastens its deterioration. If the roof is insulated, the underside of the sheathing presents a warmer surface and lessens the rapidity of the heat losses from the interior of the building, at the same time reducing the amount of condensation.

Insulation should be directly on top of the roof sheathing after it has been mopped with asphalt or coal tar, depending on the type of roof to be applied. After the insulation has been placed, it should be mopped, after which the roofing is placed in the usual manner. The insulation should be at least ½ in. thick and preferably two layers should be placed with the joints staggered.

Insulation Pays

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

The primary purpose of an enginehouse roof, as with all other roofs, is to keep out rain and snow and generally protect the interior against the elements. It should also help toward preserving the warmth of the interior in the winter and to aid in providing comfort in the summer. The better a roof is insulated, the better it will perform the functions of preserving heat in the winter and of retarding its entrance during the summer. When the warm moist air of the interior of an enginehouse comes in contact with the cold underside of an uninsulated

roof the temperature of the air is lowered; its dew point is reached, and an excessive amount of moisture, laden with corrosive gases which it has absorbed, is deposited on the roof surface. Aside from the nuisance of dripping which so often occurs, this deposit will rot the wood and corrode the metal of the roof and sides of the enginehouse. Good roof insulation will minimize this ill effect and produce other benefits.

Insulation allows closer control of interior temperatures in both the summer and the winter, thus assuring more uniformly comfortable working conditions throughout the year. This, in turn, assures increased labor output. Insulation retards the loss of heat through the roof, effecting substantial economy in fuel.

These are some of the apparent and more tangible results that may be expected from the insulation of enginehouse roofs. As yet there are no statistics available as to the increased efficiency of the enginehouse forces or the freedom from occupational diseases of workers in properly lighted, ventilated and air-conditioned enginehouses. This is a new and a broad subject which merits careful study. This study cannot be undertaken fully, however, by any one railway, or by any one firm selling insulating materials or air-conditioning equipment, for it involves factors for study by chemists, physicists and the medical profession.

However from the tangible results now known, it certainly will pay to insulate the roofs of enginehouses. Enginehouses might then well become a laboratory where the problem of occupational diseases and discomforts might be tabulated more carefully. It seems that dividends in the form of increased efficiency, human comfort and freedom from illness would become a paying proposition.

Free Movement for Switch Points

Is it preferable to bend the inside joint bars at the heel of the switch or to plane them off, to provide for free movement of the points when thrown? Why? What alternative plan, if any, can be employed?

Prefers Planing

By J. B. Kelly

General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Stevens Point, Wis.

It seems preferable to discontinue bending the inside joint bars at the heel of the switch points and make the provision for free movement by planing a portion of the bars. This will be of real assistance in freeing the movement of the points when the switch is thrown, in the present form of assembly at the heel of the point. The bars in extensive use have a bend of ½ in. in 12 in., or in half the length of the bar. This does not provide firmness in the joint and, therefore, subjects the switch to a great deal of hammering, with resultant wear. It also induces distortion of surface and alinement.

Planing would be more satisfactory, notwithstanding the more recent specification for a ¼-in. instead of a ½-in. bend of the heel joint bar. The full section of the bar should be in contact with the point rail for at least 4 in. and possibly 6 in. from the heel, measured from the point where the planing begins and from which it extends to the end of the bar. In this case, it would be beneficial to dispense with any expansion at the heel joint and chamfer the heel of the point to allow throw movement without making contact with the edges of the base and head. In this connection, the spacer thimble or the shoulder bolt, a more permanent fixture, must be maintained to keep the planed bar in normal position.

For the better maintenance of switches, there is little doubt that the option provided in current specifications to keep the point free of the stock rail is worthy of first consideration. This limits the bolting through the heel block and point but not through the stock rail. This will permit slight normal creepage of the stock rail without imposing damaging thrusts on the point, closure rail and frog. In the free-heel-block standard, a good double-shoulder switch plate should be utilized on the second heel-of-the-point joint tie.

A Subject of Controversy

By Assistant Engineer Maintenance of Way

This has been a controversial subject for many years. I have heard many debates but I do not recall one that resulted in definite conclusions. I remember that some years ago I heard a chief engineer close such a debate with the statement that since the bars could be bent with relative ease and since the cost was much less than that of planing them, he proposed to continue his practice of bending the bars.

In another instance, the chief engineer of the road upon which I was then employed would not permit either the bending or the planing of the inside bars, insisting that this was wholly unnecessary. I remember, however, that I was called out one night just after a new mechanical interlocking had been placed in service, because the operator was unable to throw the switches. As a temporary expedient we eased off the bolts that passed through the heel of the switches and this relieved the situation for the time. Then as a permanent remedy, but without discussing the matter with the chief, we reamed out the bolt holes in the points and slipped a thimble over each of the two bolts in the point end of the joint bar, of sufficient length to permit a play of about ⅛ in. when the bolts were tightened to draw the joint bar firmly against the thimble, the other end of which bore on the filler block.

In effect, of course, this scheme differed in no way from the bending or planing of the inside joint bars, but as it worked and was not obvious to casual inspection, the signal department continued to use it at all interlockings. At this time our switch points were 15 ft. long for main-line turnouts. As the length of the points increased, it was found that one thimble, placed over the forward bolt in the point, was sufficient to provide for the free movement of the point when thrown.

Personally, I have never been in favor of bending the inside bar, because, unless it is done under controlled conditions in a shop press, it is not likely to be done to best advantage. Furthermore, the bending should be done before the bars are heat-treated. Where the bending of the bars is permitted, there is always a tendency for some foremen or supervisor to bend bars in the field when the prepared bars are not readily available, sometimes with results that are by no means satisfactory.

For the longer points now in use, that is, for points 30 to 39 ft. long, I see no need for either bending or planing, even with the longer joint bars now in use. For the shorter points, say from 19 ft. 6 in. down, I prefer to use a bar at the heel of the switch, which is not more than 24 in. long and which is planed the required amount, depending on the number of the turnout and the length of the points, for the last 6 in. of its length.

This leaves the full section of the bar at the bolt nearest the joint and, so far as I have been able to observe, allows ample freedom of movement when the point is thrown, without introducing the looseness which is the weak point of both the bending of the bar and the use of the thimbles.

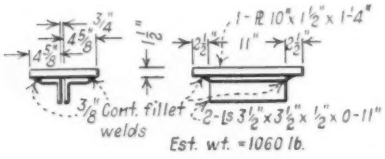
How to Transfer the Load

How can the load be transferred from a concrete cap or bridge seat to steel H-beams or other types of steel bearing piles on a pile pier? What provision can be made to prevent failure of the concrete above the ends of the steel piles?

A Simple Problem

By R. P. Hart
Bridge Engineer, Missouri Pacific, St. Louis, Mo.

No engineer would think of placing a viaduct column on a concrete pedestal foundation without providing a suitable column base to distribute the load from the column over a sufficient area of concrete to limit the unit bearing to that which is considered allowable. When constructing a concrete cap or bridge seat on piers or bents made of steel bearing piles, this problem of the column is merely



Design of Head for Steel Bearing Pile in Cap of Concrete-Trestle Bent

reversed. It is then simply a matter of providing a suitable head on the pile, which will distribute the load on the pile into the concrete with suitable unit stresses on the concrete. A drawing of one of these caps used in a bridge constructed last year is shown.

Suggests Several Ways

Bridge Department, Chicago & North Western, Chicago

Simply stated the problem is how to transfer the load from a cap to H-beams or similar sections of insufficient bearing area, used as trestle piles. This can be done in a number of ways, all of which increase the bearing area at the tops of the supporting piles:

1. By passing the longitudinal and transverse reinforcing bars of the cap through a series of holes in the webs and flanges of the piles. Where required, additional provision for bonding can be made by using bent anchor rods hung from the tops of the piles.

2. By suitable steel bearing slabs set on top of the piles, with lugs to hold them in place.

3. By lines of scrap T-rails between the piles, supported on seat angles welded or riveted to the piles.

4. By steel bearing caps consisting of channels with the flanges turned upward. The webs of the channels should be 5/8 to 3/4 in. in thickness. The depth of the channels should be 4 to 5 in. greater than the width of the flanges of the piles, and their length should be 3 to 4 in. more than the depth of the section. A hole 3½ in. in diameter can be cut in the center of the channel cap to allow fillet welding of the channel web to the web of the pile, to hold the cap in place.

The actual design of the concrete cap will depend on a number of factors not stated in the question; that is, whether the loads are concentrated at bearings some distance apart, such as those from truss or girder spans; or whether the loads are uniform as from beam or slab spans. The depth of the concrete cap is also an important factor. With a cap of sufficient depth, the load can be transferred from the cap to the steel through the bond between the concrete and the steel. Where the usual shallow caps are used, recognized principles of design should be followed in determining the location of the top and bottom of the cap with respect to the tops of the steel piles.

Lubricating Motor Cars

What rules should govern the lubrication of motor cars?

Requires Supervision

By District Engineer

When motor cars first came into use, the engines were not finished to the precision of those of today and lubrication was one of the most difficult problems we encountered in their operation. The difficulty was also enhanced by the fact that there was no experience to draw on as to what constituted a satisfactory lubricant, and no source from which this information could be obtained or at least no channels through which it was able to reach the operator or supervisory officer. It is true that manufacturers recommended certain lubricants, but the storehouse rarely had them, and more often than not the most readily available oil was used. It is not necessary to enlarge on the results of this lack of knowledge and lack of system with respect to lubrication. The early situation has been mentioned primarily to show the progress that has been made in the three decades since the motor car began to come into general use.

Today, lubrication is a matter of research and study by numerous agencies, and lubricants are produced on a far larger scale by many manufacturers and for every purpose that requires a lubricant. These agencies of manufacture and research are open to every user of lubricants, so that he does not need to have specialized knowledge of lubricants to be able to select the one most suited to his needs. On their part, the railways have learned the value of lubrication; in fact, they have bought this knowledge dearly, and today one can obtain with relative ease the lubricant most suitable for his purpose.

In general, the user of the lubricant, in the case under discussion the section or extra-gang foreman, or the track inspector, should not be allowed to choose the lubricant to be used on motor cars. Obviously, his knowledge and experience are not sufficient for this responsibility. Furthermore, experience has shown that where this has been permitted, individual operators have had their own ideas as to the best lubricant, with the result that a surprising variety of brands have been called for. On the contrary, the selection should be made by a competent central agency, which should have jurisdiction over the entire railway, which should specify the lubricant and the quantity to be used for

each class and make of motor car. A heavy duty car requires different treatment than a section car and both differ from an inspection car, especially if it is in almost continuous use, as some of them are.

Lubrication of motor cars requires about as much and as constant supervision as any other phase of maintenance. Some foremen will keep their cars to the desired standard of lubrication at all times; others will be quite negligent; while there will be many gradations between. The rules for lubrication should be simple but definite and should be enforced strictly. Car mileage is about as good a basis as any for stipulating the intervals between the application of lubricants, but since the calculation of mileage is not always exact, and as foremen sometimes allow the engines to idle for considerable periods, some allowance should be made for this. After the lubrication chart has been presented to the foreman, he should be required to follow it rigidly. Both the supervisor and the motor-car maintainer should watch closely to see that this is done.

Quality—Regularity

By Earl H. Mills
General Gas Engine Inspector, New York Central, New York

As a matter of emphasis, the rules that should govern the lubrication of motor cars can be put briefly in two words, quality and regularity, the first referring to the lubricant and the second to its use. A good lubricant of the correct type for each purpose is essential. There are so many services available for determining the correct lubricants for various purposes, that their selection is a relatively simple matter. The manufacturer's instruction book, the oil company's field service, the engineering department of the railway and similar sources of competent lubrication advice, are all available for obtaining recommendations as to the most effective and economical lubricant for each application.

The recommended types should be incorporated in a simple chart for use by the motor-car operator or maintainer who is responsible for the care of individual cars or groups of cars. Quality may be insured by buying under rigid specifications, or by purchasing a brand from responsible manufacturers. Both methods have strong arguments in their favor. Local conditions on the railway will determine which of these methods is better adapted for a particular situation. A very important aspect of quality is that all field distribution shall be in sealed containers to prevent contamination. The best oils and greases obtainable are worse than useless if they become contaminated with dirt or with liquid adulterants.

Regularity of lubrication in the case of motor cars should be based on definite mileage intervals. These intervals should be established for each type and make of car by the same agency that selects the lubricant. Thereafter, the application becomes a matter of personnel, subject to every means of discipline or reward, to insure that the schedule is carried out. Well-lubricated machinery wears slowly. Good lubricants applied at regularly-established intervals will retard this wear.

Finishing Yellow Pine

What methods are desirable in finishing new yellow pine for interior surfaces? What preparatory work is necessary? Why?

Must Seal Surface

By V. E. Engman
Chief Carpenter, Chicago, Milwaukee, St. Paul & Pacific, Savanna, Ill.

Southern yellow pine is quite resinous, for which reason it is necessary to seal the wood before applying the finish, to prevent the resin from seeping out and discoloring the finish. The wood should, therefore, be given a seal coat, with one of the many sealing liquids on the market, before the paint or varnish is applied. If the wood is to be varnished or stained and varnished, a coat of transparent shellac, used as a sealer, will give best results.

Where the surfaces are to be painted or enameled, the machine-planed surface, as received from the mill, is generally satisfactory without any preparatory work, other than filling nail holes. If the wood is to be finished with varnish in natural wood, or stained and varnished, a more satisfactory job will be obtained by first sanding the wood.

Examine Thoroughly

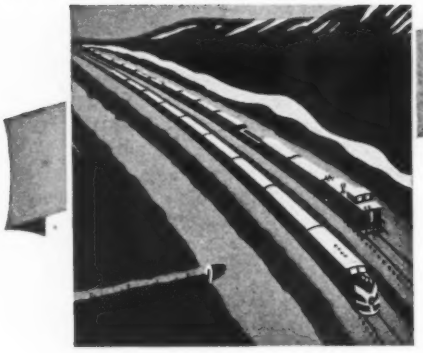
By General Inspector of Buildings

No two wood surfaces are exactly alike, even where the same species of wood is used in both. This is particularly true of southern yellow pine which is a resinous wood, for some boards will expose far more resin than others cut from trees grown in the same locality. For this reason, before any attempt is made to finish interior surfaces of yellow pine, these surfaces should be examined thoroughly by a competent person who is not only familiar with the effect that is wanted, but who can, after determining the condition of the surface, prescribe the treatment that it should be given and the materials to be used. The desirability of this examination cannot be overemphasized, for too often what might otherwise have been a pleasing effect has been ruined by omission of these precautions. Emphasis is also placed on the competence of the inspector.

It is assumed that lumber intended for interior purposes has not been allowed to weather, stain or deteriorate otherwise. The inspector should also satisfy himself that the wood is dry and that the construction is such that it will remain so. If water has access to the back of the boards, this condition should be corrected at once for if the wood is subjected to either continuous or intermittent moisture, no finish can be satisfactory.

All nail holes and cracks should be primed, being careful not to smear the surrounding surface, and filled with putty. Next, the surface should be sandpapered to remove all dirt, oil or other stains, mill marks, protruding grain and other surface defects. Unless some special treatment is required, and this can be determined only by the examination that has been suggested, the surface should be given a coat of shellac. If a natural finish is desired, white shellac should be used; if the finish is to be dark, orange shellac may be satisfactory. In any event, particular attention should be given to covering thoroughly all exposed resinous surfaces.

It is never safe to allow a surface to remain unpainted after it is ready, longer than is actually necessary. For this reason, as soon as the sandpapering has been completed on any section, the shellac or other treatment should be applied. Likewise, as quickly as practicable after the surface has been prepared, the priming coat, whether of paint or varnish, should be applied. After this has been done the painting or varnishing can then proceed in the usual manner.



NEWS of the Month

Government War Production Agencies Reorganized

On January 13 President Roosevelt appointed Donald M. Nelson, chairman of a War Production Board (W.P.B.), a new organization "granted the powers now exercised by the Supply Priorities and Allocations Board" (S.P.A.B.) and "charged with the direction of the production program" and with "general supervision over all production agencies." Following this announcement, Mr. Nelson reorganized the entire government war production set-up under the War Production Board, a change which involved the abolition of the Office of Production Management (O.P.M.). In the new set-up, railroad material requirements will continue to be handled through a Civilian Supply Division.

O.D.T. Gets Organized

Joseph B. Eastman, director of the Office of Defense Transportation, at his first press conference in that role on January 8, indicated that he would do whatever is necessary to discharge his "heavy duties and responsibilities" but that he would not try "to duplicate work which is being done effectively, nor to interfere where interference is unnecessary." At that conference and at succeeding conferences, Mr. Eastman announced appointments to his staff as follows: Victor B. Boatner, former president of the Chicago Great Western, as head of the Division of Railway Transport; Interstate Commerce Commissioner John L. Rogers as head of the Division of Motor Transport; John R. Turney, former St. Louis Southwestern vice-president in charge of law and traffic, as head of the Division of Traffic Movement and Henry F. McCarthy, passenger traffic manager of the Boston & Maine, associate director of that division; G. Lloyd Wilson, professor of transportation and public utilities at the University of Pennsylvania, as head of the Division of Rates; Otto S. Beyer, member of the National Mediation Board, as head of the Division of Transport Personnel; Colonel Charles D. Young, Pennsylvania vice-president in charge of real estate, purchases, and insurance, as head of the Section of Materials and Equipment; Leo M. Nicholson, Chicago real estate and warehouse operator, as head of the Division of Storage; Guy A. Richardson, former president of the Chicago Surface Lines and receiver for the Chicago Railways Company, as head of the Division of Local Transport; Joseph L. White, consultant on transportation problems, executive assistant; Jack G. Scott, chief of the Legal and Enforcement Section of the I.C.C. Bureau of Motor Carriers, general counsel; Fayette B. Dow, asst. on pipe lines, tankers, tank cars and tank trucks; and A. T. Wood, asst. on Great Lakes Carriers.

Opposes Moving I.C.C. From Washington

On January 5 Joseph B. Eastman, chairman of the Interstate Commerce Commission and newly appointed director of the Office of Defense Transportation appeared before a House buildings and grounds subcommittee and submitted a brief against the suggestion for moving the I.C.C. out of Washington, D. C. Mr. Eastman pointed out that the commission is engaged in activities closely related to national defense and that it must maintain close relations with Congress and with other national organizations which maintain their headquarters at Washington. He also pointed out that the law requires that the commission shall maintain its principal office and hold its general sessions at Washington, although he admitted that in view of the war emergency powers, he did not know whether the I.C.C. could be moved by Presidential edict or not.

Hearings on Rates—10 Per Cent Passenger Increase Granted

On January 5 the Interstate Commerce Commission opened hearings at St. Louis, Mo., on the application of the railroads for a 10 per cent increase in passenger and freight rates, with certain exceptions which include the present reduced fares for members of the armed forces and differential increases for rates on coal, coke and iron ore. The hearings were conducted as rapidly as possible and were closed on January 14.

On January 21, the I.C.C. approved the request of the railroads for a 10 per cent increase in passenger fares, which it estimated will bring $45,000,000 a year in added revenue, and which will take effect on February 10. The Commission reported that it was still considering the plea for a 10 per cent increase in freight rates. In the meantime, the Railway Express Agency, Inc., had published tariffs adding a 10-cent emergency charge on all l.c.l. express shipments and the Pullman Company requested authority to increase sleeping and parlor car rates by 10 per cent. Pay increases granted employees were given as the principal reason for these increases.

One of the outstanding phases of the hearings was the willingness of many shippers to accept the rate increases proposed. Foremost among those approving the increases was the National Industrial Traffic League, which passed a resolution endorsing the increases sought "in principle as a temporary measure of relief." The opponents of the increases in general recognized the railroads' need for more revenue, but objected to increased rates on certain commodities. State commissions and agricultural interests, including the Department of Agriculture, opposed increasing rates on farm products, while the Office of Price Administration testified that O.P.A. had no opinion as to the merits of the application and was only concerned with establishment of machinery for rate adjustments.

The I.C.C. is expected to announce its decision on the plea for increases in freight rates as soon as possible.

Estimated Steel Needs for 1942

The railroads have submitted revised estimates of their needs for iron and steel during 1942 to the Office of Defense Transportation. The revised estimates will require delivery of 6,613,113 net tons of iron and steel during the 12 months. This total is one-third less than originally estimated and includes 4,424,632 net tons of steel for maintenance and 2,188,481 net tons for new cars and locomotives. Of maintenance of way materials, the estimate calls for 1,632,394 net tons of rail; 887,883 net tons of fastenings; 103,262 net tons of frogs, switches, guard rails, etc.; and 137,046 net tons of steel for bridges. The estimated schedule of production of these items by months is as follows:

Maintenance of Way Steel Requirements to Be Purchased for Delivery During 1942 by Months—Net Tons

	Rail (Net Tons)	Track Fastenings	Frogs, switches, guard rails, etc.	Steel for bridges, buildings, etc.
January	174,803	80,406	10,421	8,665
February	211,451	90,701	10,624	8,322
March	270,856	120,408	12,794	11,483
April	227,474	115,321	11,980	11,002
May	199,173	109,558	10,172	11,675
June	156,860	95,515	9,489	16,249
July	120,672	75,601	8,372	14,306
August	82,255	64,702	7,554	13,262
September	59,314	43,334	7,034	14,798
October	39,964	32,660	5,601	11,548
November	51,408	31,625	5,046	8,608
December	38,164	27,952	4,175	7,128
Year	1,632,394	887,883	103,262	137,046

Association News

Maintenance of Way Club of Chicago

One hundred and fifty-nine members and guests of the club heard a discussion of what Pearl Harbor means for maintenance of way men at the meeting of the club on January 26, in the Straus building, Chicago. In a three-part program consisting of short, straight-from-the-shoulder addresses, C. P. Fisher, superintendent, Chicago Terminal division of the Pennsylvania, told those present what the operating man expects from the maintenance forces; B. R. Kulp, chief engineer of the Chicago & North Western, speaking from the standpoint of the chief maintenance officer, pointed out the new responsibilities of maintenance of way men under war-time conditions; and R. S. Kniffen, general roadmaster, Great Northern, from the standpoint of the man in the field, spoke on Getting Down to Brass Tacks.

The next meeting of the club, which will be on February 16, will be addressed by A. C. Mann, vice-president in charge of purchases and stores of the Illinois Central, who will speak on What the Track Man May Expect in Materials in the Months Immediately Ahead.

American Railway Engineering Association

January was a month of considerable association activity looking toward the annual convention in Chicago on March 17-19. Especially important are the steps being taken by the officers to key the program in with the changed conditions confronting the railways as a result of the United States entering the war, the details of which will be announced next month.

Following the long list of committees that have already completed their work prior to the convention, two other committees met during the month and completed their assignments, and, in addition, the Committee on Arrangements met in Chicago on January 16 for the purpose of completing the arrangements for the annual meeting.

The committees that met during January were: Buildings, at New York, on January 20, and Economics of Railway Location and Operation, at Pittsburgh, Pa., on January 29. Only one committee has scheduled a meeting in February, this being that on Iron and Steel Structures, which will meet at the Northwestern Technological Institute, Evanston, Ill., on February 12 and 13.

Ballots for the election of officers and directors of the association, in accordance with the nominations reported in the December issue of *Railway Engineering and Maintenance*, were mailed to members during the last week in January.

About the middle of January, Bulletin No. 429 was mailed to members, this bulletin including the reports of six standing committees to be presented at the forthcoming meeting, as follows: Wood Bridges and Trestles; Masonry; Waterproofing of Railway Structures; Impact; Iron and Steel Structures; Records and Accounts.

The February bulletin of the association, No. 430, will be mailed to members about the middle of the month, and will include reports of the committees on Ties, Wood Preservation, Roadway and Ballast, Track and Rail, as well as Professor H. F. Moore's Eighth Progress Report on the Joint Investigation of Fissures in Rails.

Bridge and Building Association

With only one exception, the personnel of all of the eight committees of the association to report at the next annual meeting in October, have been selected and the committees are at work. It is expected that the personnel of the one remaining committee will be completed shortly, and that complete committee lists can be announced in an issue of the association's news bulletin now otherwise ready to go to press.

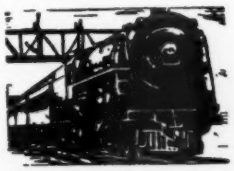
National Railway Appliances Association

Following the necessary transfer of its annual exhibit from the International Amphitheatre at the Union Stock Yards, Chicago, to the 122nd Field Artillery Armory, the association was advised that this Armory is now desired by the Navy. As a second alternative for the location of its annual exhibit, therefore, it has arranged to present its Thirty-First Annual exhibition, as a "token show," in the exhibition hall in the Palmer House, adjacent to the meeting rooms of the American Railway Engineering Association, March 16-19. While these facilities will not permit an exhibit of the magnitude of those held in previous years, they will enable the members of the N.R.A.A. to maintain the continuity of their contact with members of the A.R.E.A. and to continue with their other functions in connection with the A.R.E.A. convention. Exhibitors and others can secure full details regarding the exhibition plans from Charles H. White, secretary of the N.R.A.A. (Industrial Brownhoist Corporation), 208 So. LaSalle street, Chicago.

Roadmasters' Association

Continuing the work undertaken by the Executive committee at its meeting on December 8, 1941, the personnel of all technical committees to report at the next annual convention in September has been selected, and has been announced by President A. B. Hillman, engineer maintenance of way of the Belt Railway of Chicago and the Chicago & Western Indiana, as follows:

No. 1—The Use of Track Grinders—J. J. Clutz (chairman), div. engr., Penna., Washington, D. C.; F. J. Herlehy (vice-chairman), rdm., C.M.St.P. & P., Milwaukee, Wis.; C. W. Baldridge, asst. engr., A.T. & S.F., Chicago; F. G. Campbell, asst. ch. engr., E.J. & E., Joliet, Ill.; M. D. Carothers, div. engr., Alton, Bloomington, Ill.; W. T. Elmes, rdm., P. & L.E., Pittsburgh, Pa.; J. W. Fulmer, asst. engr., Sou., Washington, D. C.; W. R. Garrett, rdm., C.B. & Q., Hannibal, Mo.; J. W. Hopkins, supv'r. B. & L.E., Greenville, Pa.; W. E. Manning, supv'r., Sou., Orangeburg, S. C.; F. J. Meyer, rdm., N.Y.O. & W., Middletown, N.Y.; R. D. Pierson, div. engr., A.T. & S.F., San Bernardino, Cal.; J. C. Runyon, supv'r., C. & O., Covington, Ky.; and A. W. Wehner, rdm., S.P., Lake Charles, La.



No. 2—Extending the Life of Rail and Fastenings—J. B. Martin (chairman), gen'l. insp. track, N.Y.C., Cleveland, Ohio; G. B. McClellen (vice-chairman), gen'l. rdm., T. & P., Alexandria, La.; R. W. Bonney, gen'l. rdm., Seaboard, Jacksonville, Fla.; A. E. Botts, asst. engr. m. of w., C. & O., Richmond, Va.; E. J. Brown, asst. supt., C.B. & Q., Galesburg, Ill.; P. Chicoine, rdm., C.P., Vaudreuil, Que.; A. Chinn, ch. engr., Alton, Chicago; M. H. Dick, eastern engr. editor, *Railway Engineering and Maintenance*, New York; H. E. Durham, asst. engr., A.A.R., Chicago; A. E. Hendrix, supv'r., Sou., So. Clarksville, Va.; J. B. Kelly, gen'l. rdm., M.St.P. & S.S.M., Stevens Point, Wis.; F. H. Masters, ch. engr., E.J. & E., Joliet, Ill.; J. E. Padgett, rdm., M.P., Coffeyville, Kan.; J. A. Rust, rdm., Sou., Winston-Salem, N.C.; E. J. Ryan, supv'r., D. & H., Plattsburg, N.Y.; G. L. Sitton, ch. engr. m. of w. & s., Sou., Charlotte, N.C.; Lee Spencer, rdm., L.I., Jamaica, N.Y.; and E. E. R. Tratman, C.E., Wheaton, Ill.

No. 3—Recent Developments in Tamping Practices—A. B. Chaney (chairman), dist. engr., M.P., Little Rock, Ark.; W. H. Sparks (vice-chairman), gen'l. insp. track, C. & O., Russell, Ky.; M. D. Clark, engr. m. of w., P. & N., and D. & S., Charlotte, N.C.; A. J. Dillard, rdm., A.T. & S.F., Dodge City, Kan.; E. L. Farmer, rdm., St.L.S.W., Lewisville, Ark.; R. L. Fox, rdm., Sou., Alexandria, Va.; C. M. Hayes, gen'l. rdm., M.St.P. & S.S.M., Minneapolis, Minn.; W. L. D. Johnston, supv'r., Sou., Shelby, N.C.; T. F. King, rdm., Sou., Asheville, N.C.; R. W. Lucas, rdm., C.R.I. & P., Manly, Ia.; F. H. McKenney, dist. engr. m. w., C.B. & Q., Omaha, Neb.; R. E. Meyer, rdm., C. & N.W., Mason City, Ia.; E. C. Mingus, rdm., C.R.I. & P., Topeka, Kan.; P. F. Muller, rdm., C. & W.I., Chicago; R. E. Noonan, asst. rdm., B.-R.I., Tomball, Tex.; Wm. O'Brien, supv'r., P.M., Toledo, Ohio; W. F. Smock, supv'r., Sou., Somerset, Ky.; and T. L. Williamson, rdm., S. P., Winnemucca, Nev.

No. 4—Highway Crossing Construction and Maintenance—F. E. Schaumburg (chairman), rdm., C. & N.W., West Chicago, Ill.; L. M. Denny (vice-chairman), supv'r., N.Y.C., Indianapolis, Ind.; E. L. Banion, rdm., A.T. & S.F., Marceline, Mo.; C. M. Burpee, managing editor, Railway Engineering and Maintenance Cyclopedia, Chicago; C. F. Edwards, asst. div. engr., C. & O., Columbus, Ohio; G. L. Griggs, rdm., C.B. & Q., Ottumwa, Ia.; J. C. Houston, supv'r., N.Y.C., Kalamazoo, Mich.; J. C. Jacobs, supv'r., I.C., Decatur, Ill.; J. T. Killian, supv'r., Sou., Knoxville, Tenn.; H. C. Koch, rdm., Belt Railway of Chicago, Chicago; P. L. Koehler, div. engr., C. & O., Ashland, Ky.; R. C. Matthews, div. engr., A.T. & S.F., Slaton, Tex.; I. W. McPherson, rdm., M.St.P. & S.S.M., Dresser, Wis.; G. P. Palmer, engr. main. & constr., B. & O., C.T., Chicago; G. K. Sterling, rdm., C. & N.W., Eagle Grove, Ia.; F. W. Tomlinson, Jr., sec. engr.,

Penna., Far Rockaway, L.I.; T. N. Turner, rdm., M.P., Newport, Ark.; J. S. Vreeland, associate editor, *Railway Engineering and Maintenance*, Chicago; and F. G. Walter, asst. engr., I.C., Chicago.

No. 5—Maintenance of Roadway Equipment—Ray Marshall (chairman), rdm., G.N., Superior, Wis.; J. B. Akers, asst. ch. engr., Sou., Washington, D. C.; M. R Black, asst. engr., L. & N., Louisville, Ky.; W. E. Chapman, supv'r., C. of G., Columbus, Ga.; F. A. Chinquist, dist. rdm., G.N., Crookston, Minn.; R. H. Gilkey, div. engr., C. of Ga., Savannah, Ga.; N. D. Howard, managing editor, *Railway Engineering and Maintenance*, Chicago; C. J. Jaeschke, div. engr., M.P., Little Rock, Ark.; A. J. Johnson, rdm., C. & N.W., Redfield, S. D.; L V. Johnson, main. engr., M.St.P. & S.S.M., Minneapolis, Minn.; H. E. Kirby, asst engr., C. & O., Richmond, Va.; A. L. Kleine, div. engr., D. & R.G.W., Salt Lake City, Utah; W. E. Kropp, supv'r. m. of w. equip., L.V., Bethlehem, Pa.; G. W. Mehaffey, stud. appren., Sou., Asheville, N. C.; G. M. O'Rourke, asst. engr. m. of w., I.C., Chicago; E. L. Potarf, asst. supt., C.B. & Q., Sterling, Colo.; and A. H. Whisler, asst. engr., Penna., Philadelphia, Pa.

No. 6—S. J. Hale (chairman), asst. supt., N. & W., Bluefield, W. Va.; W. E. Chapman (vice-chairman), supv'r., C. of Ga., Columbus, Ga.; N. F. Alberts, gen'l. foreman, C.M.St.P. & P., Chicago; J. F. Beaver, supv'r., Sou., Durham, N.C.; A. L. Campbell, rdm., S.P., Alturas, Cal.; F. L. Etchison, gen'l. rdm., A.C.L., Rocky Mount, N. C.; H. C. Fox, supv'r., Sou., Spartanburg, S. C.; G. J. Giles, supv'r., L. & N., Harlan, Ky.; J. G. Gilley, div. engr., C. & O., Richmond, Va.; C. Halverson, rdm., G.N., Grand Forks, N. D.; G. S. King, supv'r., Sou., Chester, S. C.; J. D. Kirkland, supv'r., C.R.I. & P., Topeka, Kan.; E. K. McArthur, rdm., A. & Y., Greensboro, N. C.; W. C. McCormick, rdm., Seaboard, Savannah, Ga.; J. M. Miller, div. engr., W.M., Cumberland, Md.; D. V. O'Connell, rdm., C. & N.W., Chicago; V. P. Shepardson, rdm., T.C.I. & R.R., Ensley, Ala.; and G. E. Stewart, roadmaster, Southern Pacific, Merced, Cal.

Joyce Jacks.—A handy 36-page pocket-size catalog, designated as catalog No. 300, has been published by the Joyce-Cridland Co., Dayton, Ohio, which illustrates and describes the 289 different models and sizes of jacks, manufactured by this company, ranging from 1½ tons to 100 tons in lifting capacity.

Lumber and National Defense.—Behind the Eagle Stand the Forests, and More About Lumber and National Defense, are the titles of two bulletins recently published by the Timber Engineering Company, Inc., Washington, D.C. The first mentioned bulletin consists of 32 pages, almost solidly illustrated with photographs showing the large part that timber is playing in the construction of buildings for the Army, Navy, defense housing and defense industries. The other bulletin, which consists of eight pages, discusses the importance of lumber in the national defense program and presents data concerning the production and consumption of lumber in the United States.

Personal Mention

General

R. W. Morrison, supervisor of track on the Reading, with headquarters at Pottstown, Pa., has been promoted to general yardmaster at the same point.

Noah Bridges, roadmaster on the Middle division of the Atchison, Topeka & Santa Fe at Newton, Kan., has been promoted to assistant superintendent of the Albuquerque division, with headquarters at Winslow, Ariz.

C. W. Wilson, assistant engineer of the Eastern Kentucky division of the Louisville & Nashville at Ravenna, Ky., has been promoted to assistant trainmaster at Paris, Tenn. Mr. Wilson was born at Paris on May 6, 1901, and completed a correspondence school course in civil engineering. He entered the service of the L. & N. on September 27, 1920, as a rodman on the Memphis division. On June 2, 1927, he was promoted to instrumentman and on July 1, 1937, he was advanced to track supervisor at Paris. He was further advanced to assistant engineer at Louisville, Ky., on June 16, 1938, and in October, 1941, he was transferred to Ravenna.

J. E. Crawford, vice-president-assistant to the president of the Norfolk & Western, with headquarters at Roanoke, Va., and an engineer by training and experience,

J. E. Crawford

whose retirement on December 31, after more than 38 years of continuous service, was reported in the January issue, was born at San Diego, Cal., on December 1, 1876, and graduated in civil engineering from the University of Pennsylvania, in 1897. He was employed by the American Bridge Company from 1895 to 1903 as draftsman and designer and in July, 1903, he entered the service of the Norfolk & Western as bridge engineer, remaining in that capacity until May, 1913, when he was promoted to chief engineer. Mr. Crawford was appointed assistant general manager in February, 1923, and the following year became general manager. He was promoted to vice-president in charge of operation on December 1, 1936, and in May, 1939, he was appointed vice-president—assistant to the president, the position he held until his retirement.

J. P. Jackson, an engineer by training and experience, whose promotion to general superintendent of the Eastern general division of the Norfolk & Western at Roanoke, Va., was reported in the January issue, was born at Austinville, Va., on October 22, 1902, and graduated in civil engineering from Virginia Polytechnic Institute in 1924. He entered railroad service on June 16, 1924, as a rodman in the engineering department of the Norfolk & Western and served successively as inspector, levelman and transitman in that department. On October 7, 1929, he was appointed assistant roadmaster of the Radford division, becoming acting roadmaster of the Norfolk division on November 1, 1933, and roadmaster of that division on October 1, 1934. On October 1, 1935, Mr. Jackson became assistant superintendent of the Shenandoah division, being transferred to the Scioto division on March 1, 1938. He was promoted to superintendent of the Shenandoah division on April 1, 1939, being transferred to the Scioto Division on June 1, 1939, and to the Pocahontas division at Bluefield, W. Va., on January 1, 1940, where he remained until his recent promotion.

J. P. Jackson

C. J. Henry, division engineer of the Panhandle division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to superintendent of the Toledo division, with headquarters at Toledo, Ohio. **J. E. Morris,** division engineer of the Philadelphia Terminal division, has been advanced to superintendent of the Wilkes-Barre division, with headquarters at Sunbury, Pa. **David E. Smucker,** division engineer of the Toledo division of the Pennsylvania, with headquarters at Toledo, Ohio, has been appointed assistant superintendent of freight transportation, Western region, with headquarters at Chicago, succeeding **A. Mosby Harris,** whose promotion to division engineer of the Renovo division is reported elsewhere in these columns.

Elzear J. Brown, district engineer maintenance of way on the Chicago, Burlington & Quincy, has been promoted to assistant superintendent of the Galesburg-Beardstown division, with headquarters

as before at Galesburg, Ill. Mr. Brown was born at St. Joseph, Mo., on December 1, 1900, and attended the St. Joseph Commercial College and St. Patrick Commercial Academy. He entered railway service on May 26, 1919, as a clerk in the general yardmaster's office on the Burlington at Chicago, and was later transferred to the superintendent's office. On June 1, 1920, he was appointed an assistant roadmaster, later returning to a clerical position at Chicago. The following year he was appointed an assistant extra gang foreman and in November, 1921, he was promoted to section foreman. During the next four years Mr. Brown served as section foreman and extra gang foreman at various points in Illinois and Wisconsin. In January, 1925, he was advanced to assistant roadmaster on the Chicago-Aurora division and in September, 1926, he was transferred to Beardstown, Ill. One month later he was promoted to roadmaster, with headquarters at Chicago, and on May 16, 1939, he was promoted to district engineer maintenance of way, with headquarters at Galesburg, the position he held until his recent promotion. Mr. Brown is a member of the executive committee of the Roadmasters' and Maintenance of Way Association of

Elzear J. Brown

America and was chairman of the committee which submitted a report on Gravel Ballast—Its Requirements and Preparation, at the 1941 convention.

Engineering

R. C. Lowrey has been appointed resident engineer of the Missouri & Arkansas, with headquarters at Harrison, Ark.

J. W. Gray, instrumentman on the Illinois Central at McComb, Miss., has been promoted to assistant engineer at that point, succeeding **H. E. Chalstrom,** who has been transferred to a newly created position at New Orleans, La.

Leroy M. Elledge, assistant engineer on the International-Great Northern at Palestine, Tex., has been promoted to division engineer of the Houston terminal, with headquarters at Houston, Tex., succeeding **M. B. Kent,** deceased.

B. E. Crumpler, whose promotion to maintenance engineer of the Norfolk & Western, with headquarters at Roanoke, Va., was reported in the January issue, was born on May 8, 1905, at Bluefield, W. Va., and entered the service of the Norfolk & Western in January, 1926, as a

B. E. Crumpler

student chainman. In the following month he was promoted to draftsman, thereafter serving alternately in this position and as a transitman. At the time of his recent promotion to maintenance engineer, he was serving as a draftsman in the engineering department at Roanoke.

F. L. Riddle, engineer maintenance of way of the Pittsburgh & West Virginia, has been promoted to chief engineer, a newly created position, with headquarters as before at Pittsburgh, Pa., and **J. C. Cruikshank,** division engineer, has been advanced to engineer-maintenance of way.

Ernest B. Powell, instrumentman on the Louisville & Nashville at Ravenna, Ky., has been promoted to assistant engineer of the Eastern Kentucky division, with the same headquarters, succeeding **C. W. Wilson,** whose promotion to assistant trainmaster at Paris, Tenn., is reported elsewhere in these columns.

F. H. Lovell, designing engineer of the Central region of the Pennsylvania, has been appointed assistant engineer of bridges and buildings, with headquarters at Pittsburgh, Pa., succeeding **J. P. Walton,** whose promotion to engineer of bridges and buildings for the Western region at Chicago was reported in the January issue.

A. G. Reese, engineer maintenance of way of the Colorado & Southern and the Ft. Worth & Denver City, with headquarters at Denver, Colo., has been promoted to district engineer maintenance of way on the Chicago, Burlington & Quincy, with headquarters at Galesburg, Ill., succeeding **Elzear J. Brown,** whose promotion to assistant superintendent at Galesburg is reported elsewhere in these columns. **W. F. Broome,** engineer of the Burlington-Rock Island, with headquarters at Houston, Tex., has been advanced to engineer maintenance of way of the C. & S. and the Ft. W. & D. C. at Denver, relieving Mr. Reese. **W. A. Gunderson,** district maintenance engineer on the Chicago, Rock Island & Pacific at El Reno, Okla., has been appointed engineer-roadmaster of the Burlington-Rock Island at Houston, replacing Mr. Broome, and **C. B. Murray,** roadmaster on the Rock Island at Pratt, Kan., has been promoted to district maintenance engineer at El Reno, succeeding Mr. Gunderson.

Clyde E. Hightower, whose promotion to cost engineer of the Denver & Rio Grande Western, with headquarters at Denver, Colo., was reported in the January issue, was born at Mooresville, Mo., on September 21, 1912, and graduated in accounting from the University of Utah School of Business in June, 1938. He first entered railway service in June, 1933, and served on the D. & R. G. W. during the summer months of each year until September, 1938, as a section laborer, carpenter helper, carman helper, pipefitter helper, rail machine operator and clamshell fireman. In September, 1938, he was appointed an accountant in the budget bureau and in November, 1939, he was transferred to the engineering accounting department, where he remained until his promotion to cost engineer.

Jesse P. Walton, whose promotion to engineer of bridges and buildings of the Western region of the Pennsylvania, with headquarters at Chicago, was reported in the January issue, was born at Ercildown, Pa., on October 17, 1887, and graduated from the University of Pennsylvania in 1910. He entered railway service in September, 1911, as a draftsman in the office of the engineer of bridges of the Pennsylvania at Pittsburgh, Pa., and in July, 1917, he was promoted to chief clerk. Mr. Walton was advanced to engineer in May, 1919, and on July 1, 1925, he was promoted to assistant engineer of bridges at Pitts-

Jesse P. Walton

burgh. On May 16, 1932, he was appointed office engineer in the office of the chief engineer, Central region, and on September 1, 1937, he was appointed assistant engineer of bridges and buildings of the Central region, which position he held until his recent promotion.

Julius E. Willoughby, whose appointment as consulting engineer of the Atlantic Coast Line at Wilmington, N. C., was reported in the January issue, was born at Arkadelphia, Ala., on October 12, 1871. He attended the University of Alabama, receiving his civil engineering degree in 1892. Mr. Willoughby entered railroad service in 1892 with the Louisville & Nashville and served in various subordi-

nate positions in the engineering and land departments until 1899, when he became assistant chief engineer on the construction of new lines in Alabama. In 1900 he became engineer of construction of the Alabama and Florida branch of the Louisville & Nashville and in 1902 he became division engineer and chief engineer of the Knoxville, LaFollette & Jellico (L. & N. subsidiary). From 1905 to 1912 Mr. Willoughby was engineer of construction for the Louisville & Nashville, serving as chief engineer of the Caribbean Construction Company and the National Railroad of Haiti from 1912 to 1913. Mr. Willoughby became assistant chief engineer of the Atlantic Coast Line in 1913 and was promoted to chief engineer in 1915, which position he held until January 1, when he became consulting engineer.

Charles J. Code, who has been appointed engineer of tests, maintenance of way, of the Pennsylvania, with headquarters at Altoona, Pa., as reported in the January issue of *Railway Engineering and Maintenance,* was born on March 9, 1900, at LaCrosse, Wis. He received his higher education at Carnegie Institute of Tech-

Charles J. Code

nology, graduating in 1921. Mr. Code entered the service of the Pennsylvania on August 16, 1923, as an assistant supervisor of track on the Monongahela division. On October 13, 1926, he was promoted to supervisor of track on the Allegheny division, being transferred to the Middle division on January 1, 1928. Two years later he was promoted to division engineer on special duty in the office of the chief engineer, being transferred to the Renovo division on June 1, 1931, and thence to the Panhandle division on July 1, 1933. He was further promoted to assistant to the chief engineer maintenance of way of the Central region, with headquarters at Pittsburgh, Pa., on July 1, 1937, which position he held until his recent promotion to engineer of tests, maintenance of way.

Robert Waller Marye, whose promotion to chief engineer of the Atlantic Coast Line at Wilmington, N. C., was reported in the January issue of *Railway Engineering and Maintenance,* was born at Ashland, Va., on December 5, 1891. Mr. Marye attended Randolph Macon College, receiving his B. A. degree in 1912. He entered railroad service on December 5, 1912, with the Atlantic Coast Line, serving successively as rodman, inspector and transitman in the construction department. From May 25, 1915, to October 10, 1916, Mr. Marye served successively as rodman, instrumentman and draftsman in

Robert Waller Marye

the valuation department and on the latter date he became a resident engineer in the construction department. From August, 1917, to July, 1919, he served with the United States Army, returning to the Atlantic Coast Line on the latter date as senior assistant engineer in the construction and maintenance of way departments. He served successively as division engineer, assistant engineer of construction, field assistant to the chief engineer and assistant to the chief engineer from December 1, 1925, to January 1, 1935. On the latter date he was appointed principal assistant engineer, and in July, 1941, he was promoted to assistant chief engineer, which position he held until his recent promotion.

James F. Zanolio, whose promotion to division engineer on the Denver & Rio Grande Western, with headquarters at Grand Junction, Colo., was reported in the January issue of *Railway Engineering*

James F. Zanolio

and Maintenance, was born at Silver Plume, Colo., on December 4, 1892, and entered railway service on June 17, 1912, as a chainman on railroad location work for the D. & R. G. W., later serving as rodman, levelman and transitman on location and construction. From August 1, 1918, to March 1, 1919, Mr. Zanolio served in the U. S. Army, returning to the D. & R. G. W. on the latter date as an instrumentman. On June 15, 1927, he again left railroad service to engage in private business. On March 13, 1937, he returned to the D. & R. G. W. as an instrumentman on yard construction at Denver, Colo. On November 1, 1937, he was appointed assistant engineer maintenance of way at Alamosa, Colo. On June 1, 1938, he was appointed master carpenter of the Alamosa division, with the same headquarters and on August 16, 1941, he was promoted to acting division engineer of the Grand Junction division, with headquarters at Grand Junction. His promotion to division engineer was effective December 15.

R. Warren Grigg, whose promotion to assistant division engineer of the Ft. Wayne division of the Pennsylvania, with headquarters at Ft. Wayne, Ind., was reported in the January issue of *Railway Engineering and Maintenance,* was born at Richmond, Va., on May 27, 1907, and graduated in civil engineering from Virginia Polytechnic Institute in 1929. He entered railway service on June 16, 1929, as an assistant on the engineering corps of the Eastern division of the Pennsylvania at Pittsburgh, Pa., later being transferred successively to Uniontown, Pa., Sharon, Pa., and Wooster, Ohio. On September 1, 1931, he was appointed inspector on electrification work, office of the chief engineer, Philadelphia, Pa., and on May 10, 1932, he was appointed assistant on the engineering corps at Derry, Pa. On July 10, 1933, Mr. Grigg was promoted to assistant supervisor of track at Wellsville, Ohio, and on April 1, 1934, he was transferred to Steubenville, Ohio. Two weeks later he was transferred to Derry, Pa., and on January 1, 1936, he was promoted to supervisor of track at Orrville, Ohio. On October 16, 1936, Mr. Grigg was transferred to special duty in the office of the chief engineer of the system at Philadelphia, and on September 1, 1937, he was transferred to Piqua, Ohio. On October 1, 1939, he was transferred to New Brunswick, N. J., where he was located until his recent promotion, effective January 1.

Herbert R. Clarke, engineer maintenance of way of the Burlington Lines (including the Chicago, Burlington & Quincy, the Colorado & Southern, the Ft. Worth & Denver City and the Wichita Valley), with headquarters at Chicago, has been promoted to chief engineer maintenance of way of these lines, with the same headquarters. Mr. Clarke was born in Ireland on November 15, 1882. He came to America with his parents in 1888 and graduated from Monmouth College, Monmouth, Ill., in 1906. He entered railroad service in 1906 as a chainman on the Missouri Pacific, later being promoted to rodman. In 1907 he went with the Chicago, Burlington & Quincy as a rodman, later being advanced to instrumentman and extra gang foreman. In July, 1909, he was appointed resident engineer on the construction of a line from Herrin, Ill., to Paducah, Ky., and in May, 1911, he was promoted to roadmaster on the Aurora

division. Mr. Clarke was advanced to general roadmaster of the McCook division in November, 1919, and in October, 1921, he was promoted to district engineer of maintenance for the Lines West of the Missouri river with headquarters at Lincoln, Neb. In January, 1925, he was advanced to general inspector of permanent way and structures for the system, with headquarters at Chicago, and in 1927 his jurisdiction was extended to include the Colorado & Southern. In 1931 Mr. Clarke was promoted to engineer maintenance of way of the Burlington Lines, which position he has held until his recent promotion. Mr. Clarke has long been active in that Association, and is now senior vice-president of the American Railway Engineering Association.

Herbert R. Clarke

A. Mosby Harris, assistant superintendent of freight transportation on the Western region of the Pennsylvania, with headquarters at Chicago, has been promoted to division engineer of the Renovo division, with headquarters at Erie, Pa., succeeding **P. M. Roeper,** who has been transferred to the Pan Handle division, with headquarters at Pittsburgh, Pa., replacing **C. J. Henry,** whose promotion to superintendent of the Toledo division is reported elsewhere in these columns. **Kirk A. Werden,** supervisor of track on the Maryland division, with headquarters at Wilmington, Del., has been promoted to division engineer of the Toledo division, with headquarters at Toledo, Ohio, relieving **David E. Smucker,** whose appointment as assistant superintendent of freight transportation on the Western region at Chicago, is reported elsewhere in these columns. **Ernest R. Shultz,** division engineer of the Columbus division, with headquarters at Columbus, Ohio, has been transferred to the Philadelphia Terminal division, succeeding **J. E. Morris,** whose promotion to superintendent of the Wilkes-Barre division is reported elsewhere in these columns, and **Morton S. Smith, Jr.,** division engineer of the Monongahela division, with headquarters at Pittsburgh, Pa., has been transferred to the Columbus division, replacing Mr. Shultz. **K. J. Silvey,** supervisor of track at Trenton, N. J., has been promoted to division engineer of the Monongahela division, relieving Mr. Smith. A photograph and biography of Mr. Harris were published in the June, 1941, issue of *Railway Engineering and Maintenance,* following his promotion to assistant superintendent of freight transportation at Chicago.

Track

D. J. Martin has been appointed roadmaster on the Canadian Pacific at Yorkton, Sask., succeeding **Adolph Carlson,** who has been transferred to Lloydminster, Sask., replacing **D. C. Chisholm,** resigned.

Francis V. McLarnon, section and extra gang foreman on the Chicago, Milwaukee, St. Paul & Pacific at Freeport, Ill., has been promoted to roadmaster, with headquarters at Aberdeen, S.D., succeeding **W. H. Armstrong,** who retired from service on January 1.

B. E. Valde, engineer on the Prince Rupert dry dock on the Canadian National at Prince Rupert, B.C., has returned to his former position as roadmaster at Burns Lake, B.C., succeeding **A. L. Petersen,** acting roadmaster, who has been reappointed yard foreman at Prince George, B.C.

J. L. Porter, maintenance of way inspector on the Norfolk & Western, with headquarters at Roanoke, Va., has been promoted to assistant roadmaster on the Buchanan branch with headquarters at Grundy, Va., to succeed **H. E. Carter,** whose appointment as assistant supervisor of bridges and buildings is noted elsewhere in these columns.

V. I. Kessinger has been appointed roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Newton, Kan., succeeding **R. L. Grubb,** who has been assigned the territory formerly under the jurisdiction of **Noah Bridges,** with the same headquarters. As reported elsewhere in these columns, Mr. Bridges has been promoted to assistant superintendent at Winslow, Ariz.

J. F. Wilkinson, general track foreman on the Mississippi division of the Illinois Central, has been promoted to supervisor of track on the Cairo district, with headquarters at Jackson, Tenn., succeeding **J. F. Watts,** supervisor of track at Grand Junction, Tenn., who has retired. **Carl F. Brooks,** section foreman at Clinton, Ill., has been advanced to supervisor of track at LaSalle, Ill., succeeding **M. L. Conley,** supervisor of track at Freeport, Ill., who has retired.

Russell B. Fetters, a track supervisor on the Western division of the Chicago, Rock Island & Pacific, has been promoted to roadmaster, with headquarters at Haileyville, Okla., succeeding **C. B. Shepard,** who has been transferred to Little Rock, Ark. Mr. Shepard replaces **R. B. Smith,** who has been transferred to Pratt, Kan., relieving **C. B. Murray,** whose promotion to district maintenance engineer, with headquarters at El Reno, Okla., is reported elsewhere in these columns.

R. H. Campbell, assistant track supervisor on the Southern, with headquarters at Spartanburg, S.C., has been promoted to supervisor of track at Oxford, N.C., to succeed **J. S. Anthony,** who has been transferred to Strasburg, Va., to replace **A. H. Graham.** Mr. Graham has been transferred to Salisbury, N.C., to succeed **W. P. Mills,** who has retired after 43 years of service with this company. **H. R. Moore,** a student apprentice at Manassas, Va., has been promoted to assistant track supervisor at Spartanburg, to succeed Mr. Campbell.

J. F. Holmberg, roadmaster on the Ann Arbor at Cadillac, Mich., has been transferred to Owosso, Mich., succeeding **David T. Faries,** who has been appointed assistant supervisor of track on the Bessemer & Lake Erie at Greenville, Pa.

Helmer H. Holmberg, formerly a track supervisor on the Wabash and more recently a construction engineer on the construction of an ordnance plant in Indiana, was appointed roadmaster on the Ann Arbor at Cadillac, Mich., on January 1, to succeed his brother, J. F. Holmberg. On January 22, Mr. H. H. Holmberg was granted a furlough to enter military service with the Naval Reserves, and **Carl Yount,** section foreman at Cadillac, was promoted to acting roadmaster at that point.

W. F. Scott, assistant supervisor of track on the Reading, with headquarters at West Trenton, N.J., has been promoted to supervisor of track, with headquarters at Gordon, Pa., to succeed **John E. Reese,** who has been transferred to West Milton, Pa., where he replaces **Harry F. Bressler.** Mr. Bressler has been transferred to Lansdale, Pa., to replace **Arthur C. Palmer,** who has been transferred to Pottstown, Pa., where he succeeds **R. W. Morrison,** whose appointment as general yardmaster is noted elsewhere in these columns.

C. G. Deppen, assistant supervisor of track at Pottstown, has been promoted to supervisor of track, with headquarters at Harrisburg, Pa., to succeed **Harold K. Modery,** who has been transferred to Tamaqua, Pa. Mr. Modery succeeds **Harry F. Smith,** who has been transferred to Reading, Pa., where he replaces **Francis G. Keens,** who has been transferred to West Trenton, N.J., to succeed **Richard W. Torbert,** whose appointment as assistant chief engineer of the Oxweld Railroad Service Company was noted in the December, 1941, issue.

William A. Ryback has been appointed assistant supervisor of track at Philadelphia, Pa., to succeed **David E. Cowell,** who has been transferred to West Trenton to replace **Mr. Scott. Kenneth G. Hunt,** assistant supervisor of track at Tamaqua, has been transferred to Pottstown, to succeed Mr. Deppen.

Mr. Scott was born on September 24, 1905, at Milford, Ind., and entered the service of the Reading on June 27, 1928, as a levelman at Philadelphia. Subsequently, he served as a transitman, and on October 11, 1937, was promoted to assistant supervisor of track at West Trenton, N.J., which position he held until his recent promotion.

Mr. Deppen was born on September 28, 1908, at Reading, Pa., and entered the service of the Reading on January 21, 1926, as a rodman. Subsequently, he served as a levelman and draftsman. On February 1, 1939, Mr. Deppen was promoted to

assistant supervisor of track at Tamaqua, later being transferred to Pottstown, where he remained until his recent appointment as supervisor of track.

W. F. Poole, whose promotion to track supervisor on the Southern, with headquarters at Camden, S.C., was reported in the December issue, was born on October 25, 1906, in Davidson county, N.C. After a public school education he entered railway service with the Southern on March 29, 1919, as a section laborer. On August 1, 1924, he became an apprentice foreman, which position he held until August 1, 1929, when he became an assistant foreman, serving in this capacity and as track foreman until July, 1932. From the latter date until October, 1937, Mr. Poole held various positions, including those of laborer, relief foreman, rodman, apprentice foreman, student apprentice, welder helper, track foreman and extra gang foreman. At the end of this period he became yard foreman at Spencer, N.C., where he remained until his promotion to track supervisor at Camden.

Axel Holmstrom, whose promotion to roadmaster on the Canadian Pacific, with headquarters at Virden, Man., was reported in the December issue, was born in Sweden on August 11, 1901, and studied a correspondence school course. He entered railway service on August 1, 1916, as a section man on the Canadian Pacific at Wabigoon, Ont., later being transferred to Kenora, Ont. On April 8, 1920, he was promoted to relief foreman and in October, 1930, he was appointed section foreman at Eagle River, Ont., serving in that capacity and as assistant foreman on extra gangs until 1939, when he was appointed relieving roadmaster at Winnipeg, Man. Mr. Holmstrom continued as relieving roadmaster and section foreman at Eagle River until his recent promotion.

Chester G. Lybarger, whose promotion to supervisor of track on the Pennsylvania, with headquarters at Logansport, Ind., was reported in the December issue, was born at Manns Choice, Pa., on March 19, 1897, and entered railway service on July 2, 1915, as a trackman on the Cresson division of the Pennsylvania. He left the service in 1919, but returned on April 1, 1924, as a trackman on the Cresson division, later serving as assistant foreman and foreman of track on that division and on the Pittsburgh and Baltimore divisions. From June, 1937, to December, 1937, he served as general foreman on the Middle division, returning on the latter date to the Baltimore division, and on April 1, 1939, he was appointed general foreman of the Eastern Region rail train. On October 1, 1939, Mr. Lybarger was advanced to assistant supervisor of track at Rochester, Pa., the position he held until his recent promotion, effective November 1.

Frank Aikman, Jr., supervisor of track on the Logansport division of the Pennsylvania, with headquarters at Union City, Ind., has been transferred to Greenville, Ill., replacing **G. C. Vaughan,** whose transfer to Wilmington, Del., was reported in the January issue. **George Baylor,** supervisor of track at Crestline, Ohio, has been transferred to Trenton, N.J., succeeding **K. J. Silvey,** whose promotion to division engineer of the Monongahela division is reported elsewhere in these columns, and **J. E. Dixon,** supervisor of track at Carnegie, Pa., has been transferred to Crestline, relieving Mr. Baylor. **C. R. Merriman,** assistant supervisor of track on the Panhandle division, has been promoted to supervisor of track at Carnegie, replacing Mr. Dixon, and **W. K. Mangum,** assistant supervisor of track on the Williamsport division, has been transferred to the Panhandle division, with headquarters at Steubenville, Ohio, succeeding Mr. Merriman. **W. R. Catching,** assistant on the engineer corps of the Eastern region, has been promoted to assistant supervisor of track on the Williamsport division, relieving Mr. Mangum.

W. H. Kendall, supervisor of track in the office of the supervisor of operating expenditures at Philadelphia, Pa., has been appointed supervisor of track at Wilmington, Del., succeeding **Kirk A. Werden,** whose promotion to division engineer of the Toledo division is reported elsewhere in these columns. **D. W. Force,** supervisor of track at Harrington, Del., has been transferred to the office of the supervisor of operating expenditures, replacing Mr. Kendall, and **H. S. Unangst,** assistant yardmaster on the Philadelphia Terminal division, has been promoted to supervisor of track at Harrington, relieving Mr. Force.

H. W. Seeley, assistant main line supervisor of track, with headquarters at Coshocton, Ohio, has been promoted to branch line supervisor of track, with headquarters at Akron, Ohio, succeeding **J. E. Buford,** who has entered military service.

J. J. Maher, assistant supervisor of track at Carnegie, Pa., has been transferred to Coshocton, Ohio, succeeding Mr. Seeley, and **H. C. Kohout,** assistant supervisor of track on the Chicago Terminal division at Colehour, Ill., has been transferred to Carnegie, replacing Mr. Maher. **A. E. Myles,** assistant on the engineering corps at Columbia, Pa., has been appointed assistant supervisor of track at Colehour, relieving Mr. Kohout. **W. B. Miller,** assistant on the engineering corps of the Ft. Wayne division, has been promoted to assistant supervisor of track, with headquarters at Harrisburg, Pennsylvania.

Bridge and Building

Herman Heizenbuttel, supervisor of bridges and buildings on the Chicago & North Western, with headquarters at Norfolk, Neb., remains at that point, instead of being transferred to Fremont, Neb., as incorrectly reported in the January issue.

H. E. Carter, assistant roadmaster on the Buchanan branch of the Norfolk & Western, with headquarters at Grundy, Va., has been appointed assistant supervisor of bridges and buildings on the Scioto division, with headquarters at Portsmouth, Ohio, to succeed **R. F. Alley,** who has been appointed assistant yardmaster at Auville, W. Va.

M. A. Berringer, supervisor of bridges and buildings on the Illinois Central at Vicksburg, Miss., has been promoted to bridge inspector, Northern lines, with headquarters at Chicago, succeeding **E. H. Tustin,** who retired on January 1, and **W. F. Clark,** bridge and building foreman at Vicksburg, has been promoted to supervisor of bridges and buildings, at that point, relieving Mr. Berringer.

T. B. Coolidge, assistant supervisor of bridges and buildings on the New York Central at Syracuse, N.Y., has been promoted to supervisor of bridges and buildings, with headquarters at Erie, Pa. **W. F. Clayman,** supervisor of bridges at Ashtabula, Ohio, has been appointed assistant supervisor of bridges and buildings, with the same headquarters. **A. N. Page,** building inspector at Cleveland, Ohio, has been appointed assistant supervisor of bridges and buildings at Erie. **J. J. Schrambeck,** supervisor of bridges at Cleveland and **C. S. Holden,** assistant supervisor of buildings at Cleveland, have been appointed assistant supervisors of bridges and buildings, with the same headquarters. **Harry F. Bird,** bridge and building inspector, with headquarters at Jersey Shore, Pa., has been promoted to assistant supervisor of bridges and buildings, with headquarters at Syracuse, succeeding Mr. Coolidge. Mr. Coolidge was born on April 1, 1893, at Harrisburg, Pa., and after a public school education entered railway service with the New York Central in June, 1910, as a freight clerk at Jersey Shore. In March, 1913, he became a clerk in the division accounting office at the same point, being assigned to the engineering corps in September, 1917. Mr. Coolidge was appointed bridge and building inspector at Jersey Shore in September, 1926, and in April, 1934, he was advanced to assistant supervisor of bridges and buildings of the Syracuse division, with headquarters at Syracuse. He was holding the latter position at the time of his recent promotion to supervisor of bridges and buildings at Erie.

Obituary

Gustav D. Wetterstrand, resident engineer for the Canadian National at Prince Rupert drydock, Prince Rupert, B.C., died recently at his home in Vancouver, B.C.

Henry Douglas Pollard, co-trustee and president of the Central of Georgia, and an engineer by training and experience, died at his home in Savannah, Ga., on January 7.

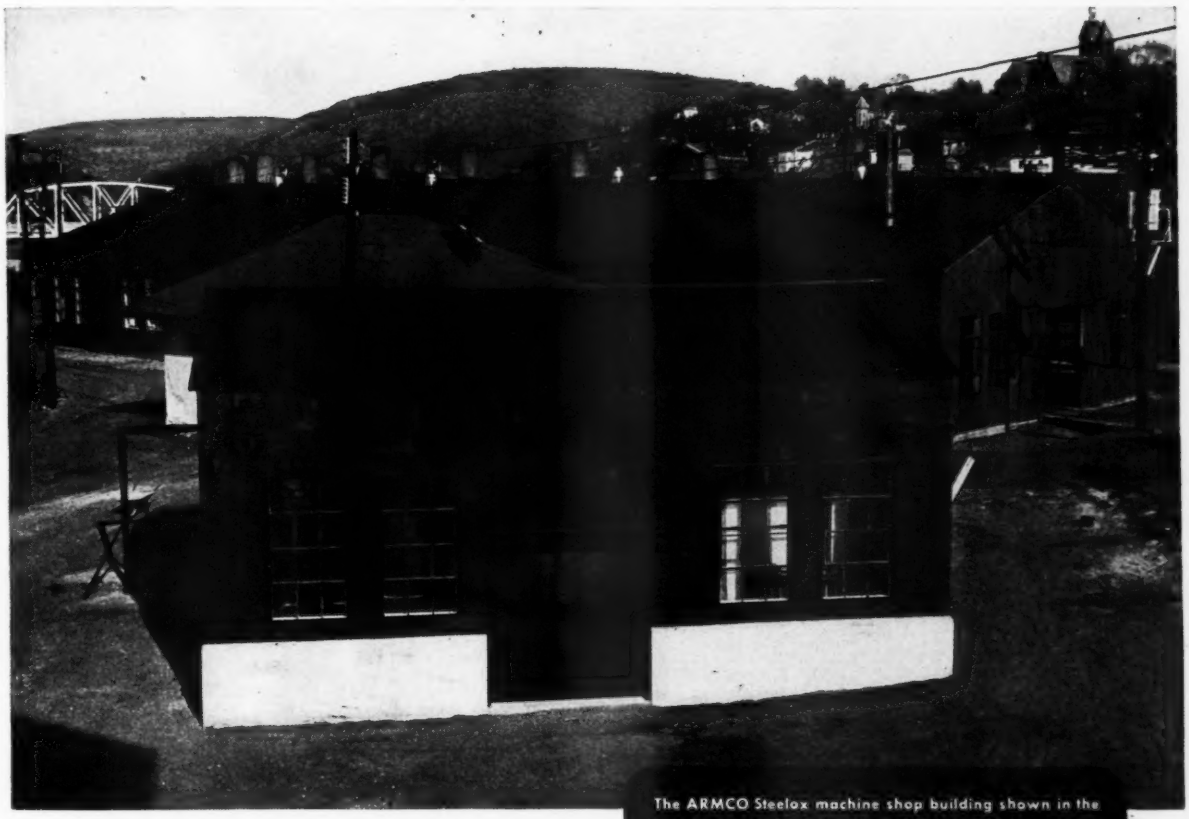
Crowell A. Snodgress, supervisor of track on the Chesapeake & Ohio, with headquarters at Richmond, Ind., whose death on November 12 at Peru, Ind., was reported in the January issue, was born at Losantville, Ind., on July 24, 1890, and entered railway service on May 4, 1904, as a track laborer on the Chicago, Cincinnati & Louisville (now part of the C. & O.). On June 15, 1915, he was promoted to section foreman and on May 4, 1925, he was advanced to supervisor of track at Williamsburg, Ind., later being transferred successively to Muncie, Ind., and Richmond.

O. V. Parsons, assistant engineer on the Norfolk & Western, with headquarters at Roanoke, Va., died on December 10 at his home in Roanoke after a brief illness. Mr. Parsons first entered the service of

(Continued on page 122)

THEY BEAT DISASTER

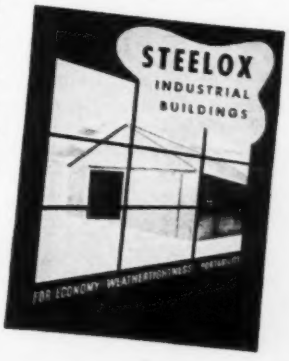
and profited six ways



The ARMCO Steelox machine shop building shown in the rear measures 48 feet wide x 144 feet 8 inches deep x 14 feet high. Officials liked it so well they modernized a pump house in the foreground with similar construction. Both buildings were immediately painted black.

This eastern railroad needed quick action when fire destroyed an important machine shop. An ARMCO Steelox Building provided a ready answer and the railroad profited in these 6 ways: **1.** ARMCO Steelox Buildings are quick and easy to erect. **2.** They are reasonable in cost and require but little maintenance. **3.** The design is flexible to meet all railroad requirements. **4.** Steelox Buildings are prefabricated from ARMCO PAINTGRIP sheets. Immediate painting, long paint life and utmost durability are assured. **5.** The construction is dust- and weather-tight as well as proof against rodents, termites, fire and lightning. **6.** Steelox provides a permanent building with portable features. This means complete salvage value in case of site changes or future remodeling.

For the whole time-and-money-saving story send for the fact-packed engineering catalog on ARMCO Steelox Buildings. Write to ARMCO RAILROAD SALES CO. Inc., 251 Curtis Street, Middletown, Ohio.



ARMCO STEELOX BUILDINGS

this company in 1903, as a chairman on new line construction, later being advanced, successively, through the positions of inspector, transitman and draftsman. He assumed the latter position in the chief engineer's office at Roanoke in 1907. In 1913, he was promoted to chief draftsman, and five years later, became office engineer. In 1919, Mr. Parsons was appointed assistant engineer on the Pocahontas division, being transferred to the chief engineer's office in 1926 where he served on general assignments until June, 1932. At the end of this period Mr. Parsons, continuing as assistant engineer, was given supervision over construction and maintenance engineering on the Norfolk, Shenandoah and Radford divisions, in which capacity he served until his death.

William J. Backes, consulting engineer of the Boston & Maine, with headquarters at Boston, Mass., died on January 20 at Massachusetts General Hospital after collapsing at North Station while waiting for a home-bound train. Mr. Backes was born at Hartford, Conn., on April 29, 1879, and received his B.S. degree from Sheffield Scientific school, Yale college, in 1899 and his C.E. degree from Pennsylvania Military college in 1919. Mr. Backes entered railroad service in 1899 as a rodman and leveler with the Mexican International. From September to December, 1900, he served as assistant foreman, with the American Dry-Kiln Co., Mexico, and from 1901 to 1902 he was assistant on engineering corps of the Pennsylvania Lines West of Pittsburgh, becoming a transitman on that road in the latter year. From 1903 to 1905 Mr. Backes was a transitman on the New York, New Haven & Hartford and during the following year he served as an assistant engineer on the New York, Pennsylvania & New Jersey (now a part of the Pennsylvania). He was chief engineer of the Central New England (now a part of the New Haven) from 1906 to 1913, when he became engineer maintenance of way for that road. In 1923 Mr. Backes was appointed assistant general manager of the New York, New Haven & Hartford and he became engineer maintenance of way of the Boston & Maine in 1926. From 1927 to 1936 Mr. Backes was chief engineer of the Boston & Maine and in 1936 he became consulting engineer, which position he held until his death.

Supply Trade News

Personal

Max W. Babb, president of the **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis., has been elected chairman of the board, a position which has been vacant since the death of **Otto H. Falk** on May 21, 1940. **W. C. Buchanan,** a director and member of the executive committee, has been elected president.

Mr. Babb was born in Mount Pleasant, Iowa, in 1874, and graduated from Iowa Wesleyan College in 1895, subsequently studying law at the University of Michigan, where he received his LL.B. in 1897. Upon leaving the University Mr. Babb became associated with his father and practiced law at Mt. Pleasant for seven years. In 1904, he moved to Chicago and joined the Allis-Chalmers Company (now

Max W. Babb

the Allis-Chalmers Manufacturing Company) as its attorney. In 1913 Mr. Babb was elected vice-president and in 1932 he was elected president.

Mr. Buchanan was born in Johnstown, Pa., in 1888 and studied mechanical engineering and metallurgy at the Carnegie Institute of Technology. In 1904 he went with the Cambria Steel Company at Johnstown, Pa., later holding positions with the Donner Steel Company, Buffalo, N.Y.; the American Tube & Stamping Co., the Bethlehem Steel Company and the Trumble Steel Company. In 1929 he went with the Keystone Steel & Wire Co., Peoria, Ill., as vice-president and general manager and in 1935, he resigned that position to become president of the Globe Steel Company at Milwaukee, Wis., which position he still holds.

Ralph E. Keller, engineer of the **Kalamazoo Railway Supply Company,** has been promoted to sales manager and chief engineer, with headquarters as before at

Ralph E. Keller

Kalamazoo, Mich., Mr. Keller entered the employ of this company on February 1, 1914. After serving as draftsman, designing engineer and sales engineer he was promoted to chief engineer in June, 1927, and on December 19, 1941, was promoted to sales manager and chief engineer.

J. Rogers Davis, who joined the **Chicago Pneumatic Tool Company** in December, has been appointed supervisor of branches, a newly created office, to assist in the sales activities of the company's district and sub-district offices.

James B. Hayden, whose election as vice-president in charge of sales of the **Industrial Brownhoist Corporation,** Bay City, Mich., was reported in the January issue, began his career in 1896 as a draftsman for the Walker Manufacturing Company, Cleveland, Ohio, and two years later became chief draftsman for the U. S. Commission to the Paris Exposition. In 1900 he entered the employ of the Brown Hoisting Machinery Company, Cleveland, as a draftsman and after holding the position of mechanical draftsman from 1900 to 1910, engineer in charge of the mechanical drafting department from 1910 to 1918 and manager of the power house equipment and ferroinclave sales for this company and its successor, The Industrial Brownhoist Corporation, from 1918 to 1932, was made assistant sales manager. After holding the latter position until 1939, he was promoted to sales manager, the position he held until his election as vice-president in charge of sales.

Obituary

George H. Goodell, manufacturers' agent at St. Paul, Minn., for the Q. & C. Co., the Cullen-Friestedt Company, the Northwestern Motor Car Company, the National Lock Washer Company, the Edgewater Steel Company, the Standard Car Truck Company and the Standard Railway Equipment Company, died in that city on December 27.

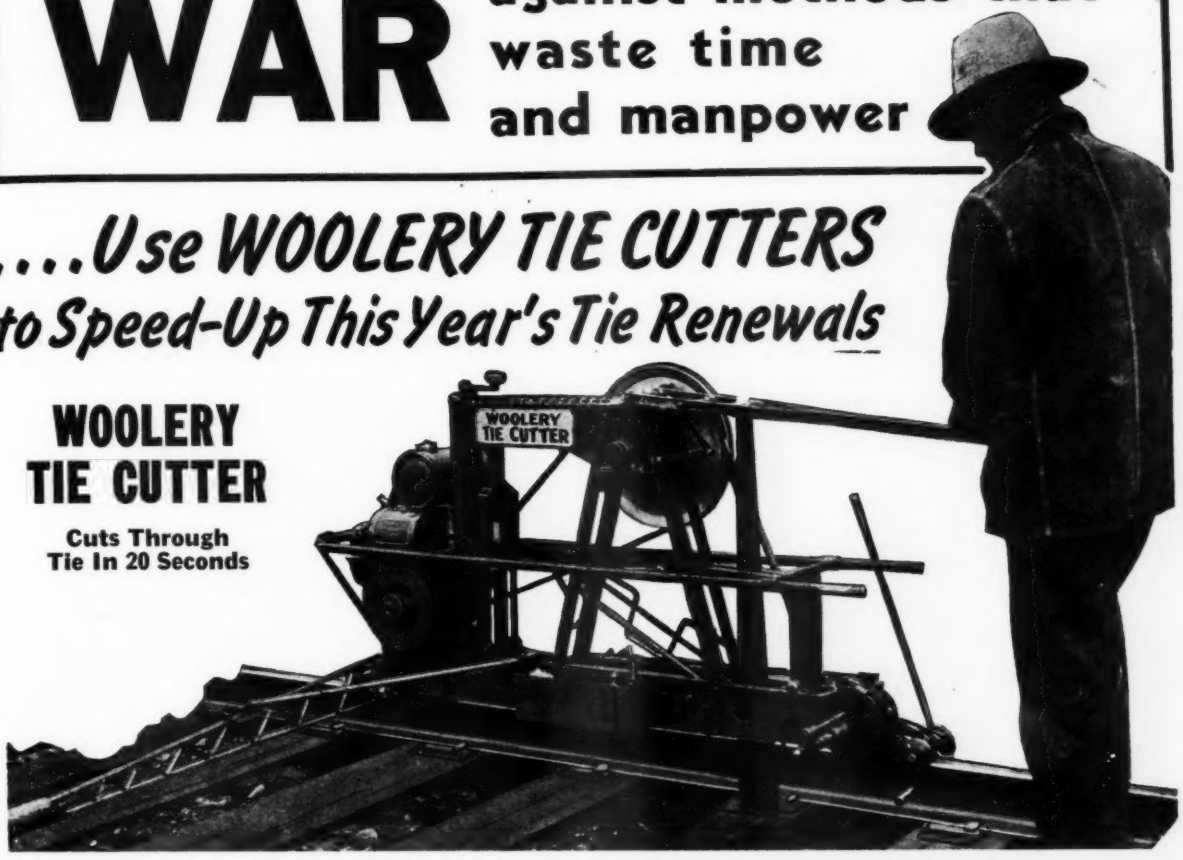
George Cook Kimball, a director and executive vice-president at Chicago of the United States Steel Corporation, a director and president of the Illinois Steel Company, and a director and executive vice-president of the Carnegie-Illinois Steel Corporation, with headquarters at Chicago, died on January 12 at the Passavant hospital in that city after an illness of about a year.

Arthur Aigeltinger, vice-president of the American Brake Shoe & Foundry Co. in New York, died on December 30. Mr. Aigeltinger began his career in 1908 with the Manganese Steel Rail Company, holding successively the positions of chief engineer, vice-president and president. In 1918, he retired from this company to become vice-president of the American Malleables Company, of which he was president from 1922 until its dissolution in 1936. Meanwhile he had been appointed assistant to the president of the American Brake Shoe & Foundry, the parent company, in 1929, and was elected vice-president in 1934.

Right-of-Way Drainage—The Young and Greenawalt System of Right-of-Way Drainage with Corrugated Metal Culverts, is the title of a new booklet published by Young & Greenawalt, East Chicago, Ind. This booklet dwells on the proper disposal of water under varying conditions and presents case studies of various drainage projects with interesting illustrations.

WAR against methods that waste time and manpower

....Use WOOLERY TIE CUTTERS to Speed-Up This Year's Tie Renewals



WOOLERY TIE CUTTER

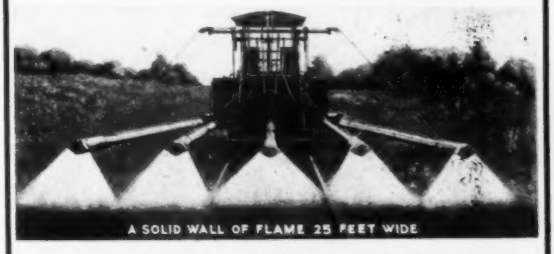
Cuts Through Tie In 20 Seconds

With traffic moving in record volume and at high speeds . . . with maintenance requirements larger and more complex . . . the problem of completing this year's tie renewal program in the face of an acute scarcity of labor is not simple.

Woolery Tie Cutters provide the answer! By eliminating the laborious process of "digging-out" and pulling ties, these machines have reduced time and labor by 30% in renewing millions of ties on leading railroads. And, as a result, this work has been completed weeks ahead of schedule.

The tie cutter cuts the ties into three pieces that are quickly and easily removed with minimum disturbance to ballast. Trenching is eliminated, follow-up surfacing is reduced 50% and the new ties rest on firm solid beds without creating the usual soft spots.

Detailed information and performance figures will be gladly sent on request. Ask for FREE DEMONSTRATION.



A SOLID WALL OF FLAME 25 FEET WIDE

WOOLERY WEED BURNERS

For fastest, most economical maintenance of clean track all-year around. Models available for every track need. 3- and 5-burner types for main line track; 2-burner type for branch lines and yards; Portable model for use on or off track, for melting snow, etc. Woolery Weed Burners are used by over 60 railroads.

WOOLERY MACHINE COMPANY

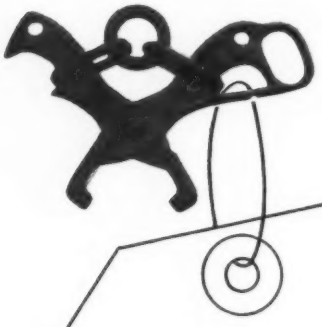
MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

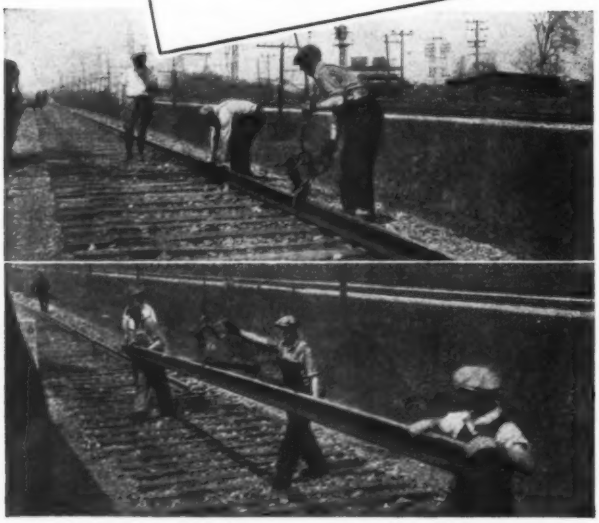
Handling rail *safely* . . .



Burro Anti-Slip Rail tongs give you the safest, fastest, and most economical rail lifting equipment you can use. These patented tongs have a gripping power that never lets a rail slip. They never pinch a man's hand, are easy to attach, quick to release and will handle up to 150 lb. rail. Rail may be picked up safely anywhere along its length, at the center or near either end without danger of its sliding out.

The balanced toggle action of the patented Burro Tong never permits the angularity of the toggle links to be less than 90° with respect to each other, and the gripping power of the tongs is practically the same whether the jaws are fully opened or fully closed . . . tongs will handle rail by either the head or base.

Burro Tongs are made of heat treated manganese vanadium steel. They never need adjustment. Write today for circular and prices.



● BURRO CRANES offer these advantages: Fast travel, low overall height, short tail swing, wide operating range, high tractive effort, power set-off mechanism. Two sizes.

CULLEN-FRIESTEDT CO.,
1301 S. KILBOURN AVE. CHICAGO, ILLINOIS

BUDA MAINTENANCE OF-WAY EQUIPMENT

to help "Keep 'Em Rolling"

RAIL BENDERS:

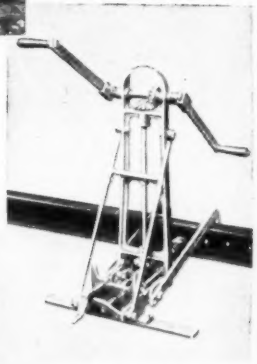
(Right) For fast, accurate bending of all "T" rails up to 130 lbs., Buda "Jack Type" Benders are unsurpassed. One man can easily operate bender. This sturdy tool will produce any required degree of rail bend *on the job, without heating rail.*

TIE PULLERS:

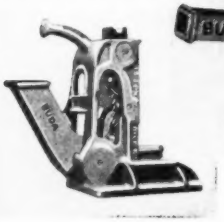
(Left) Buda tested Tie Pullers save time, money and labor for all railroads that use this compact, lightweight maintenance tool. Patented construction.

TRACK JACKS:

Buda Trip Ratchet Type Jacks are designed and built to handle track maintenance jobs. There are high and low types and single or double acting types.



(Right) Buda Track Jack Model 715. Capacity 15 tons. (Below) Buda Track Jack Model 515. Capacity 15 tons.



TRACK DRILLS:

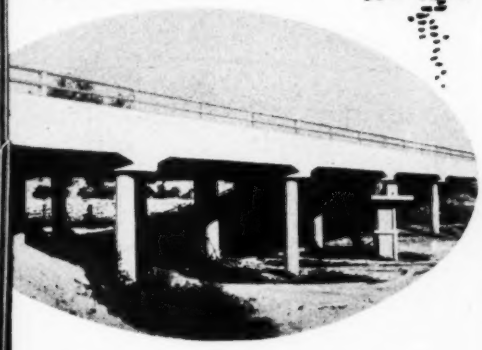
(Above) Buda "Hy-duty" Paulus Track Drills are standard on many leading railroads for bolt hole drilling of "T" rail, girder rail, or "I" beams. Clamps may be adjusted to drill rail and plate at the same time.

● *Shown here is some of the Buda Maintenance-of-way equipment designed to help you "Keep 'Em Rolling" for 1942, and for years to come. If you have a maintenance problem, get in touch with Buda now. Perhaps we can offer an economical solution.*

THE BUDA CO.
HARVEY (Chicago Suburb) ILLINOIS

DEPEND on BUDA for Railway Equipment and Supplies

ARIZONA BRIDGE GETS FULL SUPPORT FROM MONOTUBES

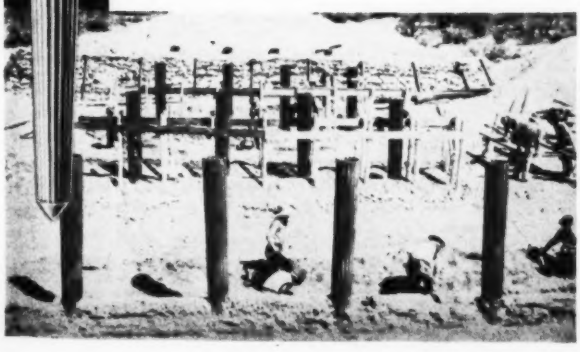


Here's another example of how Monotube Piles are being used both effectively and economically as trestle columns in modern bridge construction. The structure illustrated is located on the Douglas-Safford Highway in Graham County, Arizona.

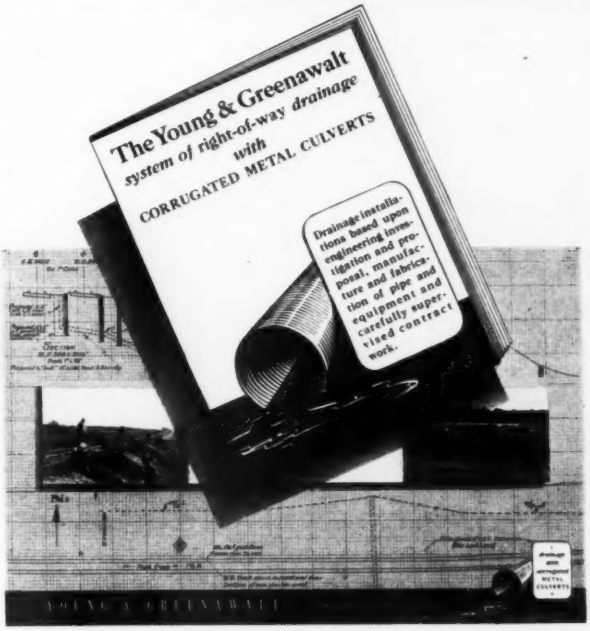
A Monotube specification satisfies every need for strength, savings and speed. These tapered steel casings are available in gauges, tapers and sizes to meet all load-carrying requirements. They are light weight for easy handling; drive faster because they require no mandrel; can be installed with standard crane equipment; and are extendible for varying lengths (this feature also permits driving in low headroom).

Union Metal engineers will be glad to aid you in adapting Monotubes to your piling needs. Write for Catalog No. 68A.

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO



Reducing roadbed maintenance more than 30 per cent


The Young & Greenawalt
system of right-of-way drainage
with
CORRUGATED METAL CULVERTS
Drainage installations based upon engineering investigation and proposal; manufacture and fabrication of pipe and equipment and carefully supervised contract work.

★

The Young and Greenawalt system of right-of-way drainage has made so many important savings in roadbed maintenance costs that we are certain you will be interested in this new booklet which tells the story of our work.

Yearly savings due to track stabilization through scientific drainage DO reach remarkable proportions in many instances. The above headline refers to one. Here, as explained in our booklet, longitudinal drainage through a cut 8900′ long established this definite maintenance economy. The coupon below will bring you a copy of "The Young and Greenawalt system of right-of-way drainage with Corrugated Metal Culverts" without obligation. It is a timely, interesting booklet which should be in your files.

Young & Greenawalt
1000 East 148th Street
East Chicago, Indiana

Gentlemen: Please send me the booklet.

Name .....

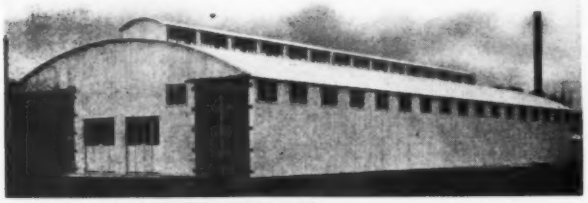
Title .....

Firm .....

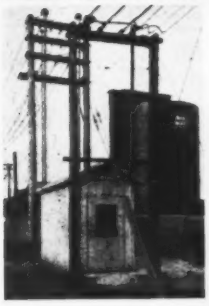
Address .....

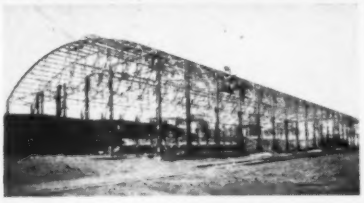
Young & Greenawalt
1000 East 148th Street — East Chicago, Indiana

Less Investment—
Quicker Charge-Off!
Install in Days
Instead of Weeks!



BUTLER READY-MADE STEEL BUILDINGS





Fruit Houses . . Car Repair Shops . . Truck and Bus Garages . Material Depots and Treating Plants . Scale Houses . . Track Car Houses . . Machine Shops . . Signal Towers and Transformer Houses . .

These . . . and many other railway structures . . . are now ready-made of steel . . . fit into railway economy programs better than any other fire-safe type of construction.

Standardized unit design facilitates quick assembly on location, enlarging, taking down and re-erection . . . complete, ready-made materials in orderly arrangement promotes quick installation without interruption . . . permanence is inwrought in both materials and structural design.

The standardized unit design of Butler Ready-Made Steel Buildings is flexible. **Butler engineers gladly collaborate to incorporate the ideas of railway engineers to fulfill particular requirements.**

BUTLER MANUFACTURING COMPANY
1238 Eastern Ave. KANSAS CITY, MO.
938 Sixth Ave., S. E. MINNEAPOLIS, MINN.

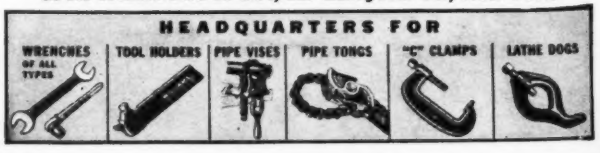
WILLIAMS
SUPERIOR DROP-FORGED TOOLS

WRENCHES OF PROVEN QUALITY

Whatever your wrench requirements, as long as quality and fine workmanship are essentials, you can always depend on Williams Wrenches. The Williams' line includes Open-end, Box, Reversible Ratchet, Socket and Detachable Socket types—both carbon and alloy steel. There are more than 50 different patterns—over 1000 standard sizes—to do better work, better. Sold by industrial distributors everywhere.

J. H. WILLIAMS & CO., 225 Lafayette St., New York

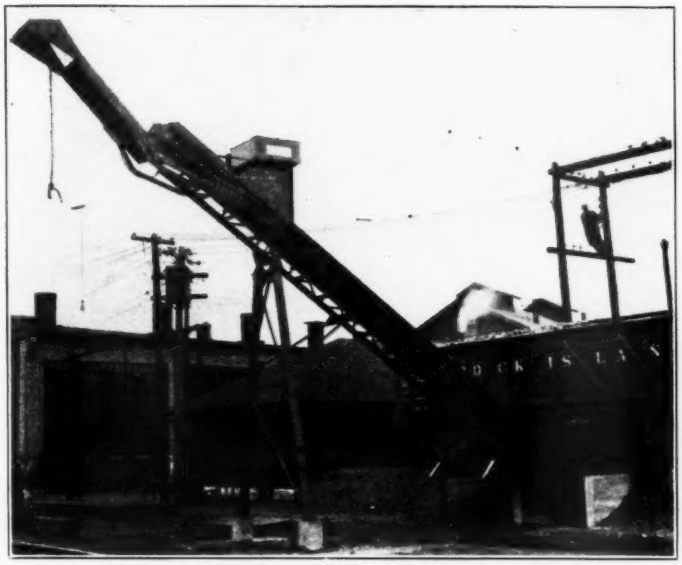
HEADQUARTERS FOR



THE FAMOUS

"RED DEVIL" LOCOMOTIVE COALER

REGISTERED IN UNITED STATES PATENT OFFICE



36 Railroads have purchased 87 "Red Devil" Locomotive Coalers

15 Railroads have placed 2 Repeat Orders

10 Railroads have placed 3 Repeat Orders

7 Railroads have placed 4 Repeat Orders

6 Railroads have placed 5 Repeat Orders

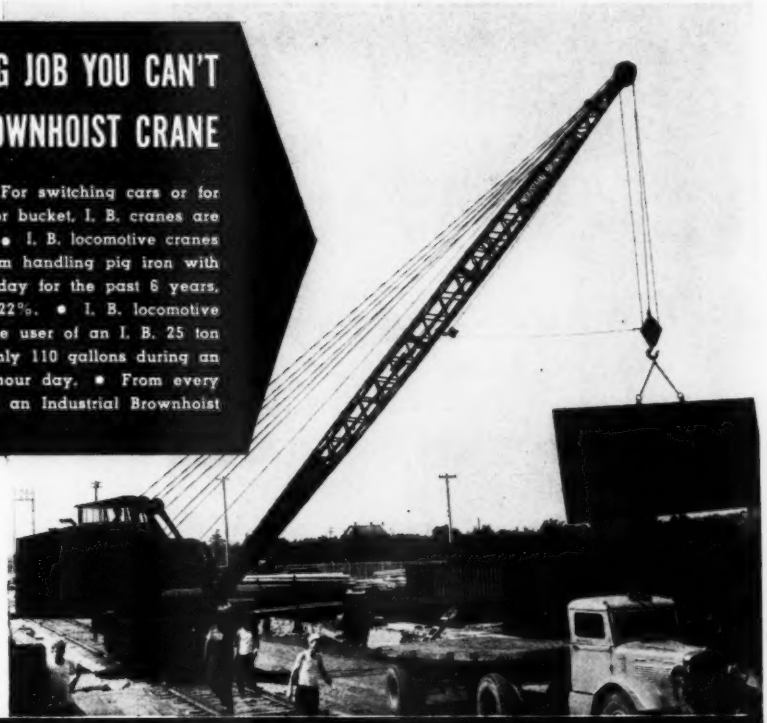
1 Railroad has placed with us 12 orders for "Red Devil" Locomotive Coalers.

ROSS AND WHITE COMPANY.

CHICAGO DAILY NEWS BUILDING — CHICAGO, ILLINOIS

FOR EVERY HEAVY LIFTING JOB YOU CAN'T BEAT AN INDUSTRIAL BROWNHOIST CRANE

I. B. locomotive cranes are versatile. For switching cars or for material handling with magnet, hook or bucket, I. B. cranes are designed to give maximum efficiency. • I. B. locomotive cranes are dependable. For example, one firm handling pig iron with an I. B. crane, from 8 to 24 hours a day for the past 6 years, reports time-out for repairs of only 1.22%. • I. B. locomotive cranes are economical to operate. One user of an I. B. 25 ton Diesel reports a fuel consumption of only 110 gallons during an 81 hour period—less than 66c per 8 hour day. • From every standpoint it will pay you to operate an Industrial Brownhoist Crane. Write today for further facts.



The new patented Monitor-type cab on I. B. Gasoline or Diesel Cranes from 10 through 40 tons provides 360° visibility, less heat, less noise and better ventilation for the operator.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

GENERAL OFFICES: BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

• SHORTEN
9 Right-of-Way Jobs
Save Tools • Labor • Material

Grinding Frogs

With

Mall TRADE MARK

OFF-THE-TRACK POWER UNIT

•

With a shortage of tools, labor and materials and time at a premium—this MALL 5 H.P. Off-the-Track Power Unit provides machine shop action anywhere on the right-of-way. It is a one-man unit that can be wheeled right where it is needed. The gasoline engine will operate by itself in any remote spot with surprisingly little fuel. And, the variable speed control assures the correct speed for each application. This multiple-duty unit will mechanize many everyday jobs that waste time, labor and materials when done by hand methods. Rail grinding, Sanding, Sawing with Chain or Circular Saw, Wire Brushing, Drilling in Concrete, Stone, Brick or Wood, Concrete Vibrating, Concrete Surfacing, Pumping and Sharpening Tools can all be handled with speed and precision. The interchangeable tools for each of these jobs can be changed as easily as bits in a brace—an important feature. You can see this unit in action on your right-of-way—at our expense. Write today for literature and details.

MALL TOOL COMPANY
RAILROAD DEPARTMENT
7746 SOUTH CHICAGO AVE. CHICAGO, ILL.
SALES OFFICES IN PRINCIPAL CITIES

AMERICA'S STURDIEST BABBITT METAL TAPES

LUFKIN "MICHIGAN" CHAIN TAPES

The extra tough steel lines are white metal coated and markings are deeply stamped into Babbitt Metal. You can't beat them for dependability and durability.

WRITE FOR FREE CATALOG

NEW YORK 106 Lafayette St. — THE LUFKIN RULE CO. SAGINAW, MICHIGAN — Canadian Factory WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

4th EDITION

STRING LINING OF CURVES MADE EASY

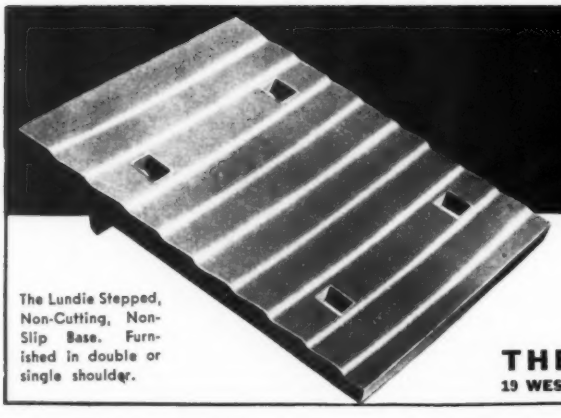
By CHARLES H. BARTLETT

To meet the continuing demands for this booklet, reprinting a series of articles published originally in Railway Engineering and Maintenance, a fourth edition has just been printed and is now available.
Written to meet today's exacting standards for curve maintenance, this booklet presents in detail a method of proven practicability for checking and correcting curve alinement readily with tools that are at hand. It makes possible the accurate realinement of curves without engineering instruments or other appliances than a string and a rule.
Three editions of this booklet, each of 1,000 copies, have already been purchased by track men. Send for your copy of this practical aid for track maintenance.

FIFTY CENTS A COPY

RAILWAY ENGINEERING AND MAINTENANCE
105 W. Adams Street **Chicago, Ill.**

LUNDIE
TIE PLATES



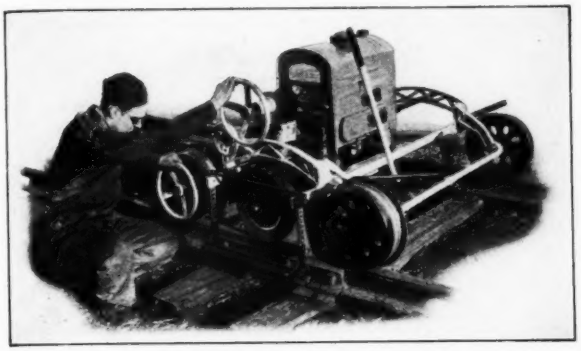
The Lundie Stepped, Non-Cutting, Non-Slip Base. Furnished in double or single shoulder.

The Lundie Tie Plate is designed with a stepped base which brings the wheel loads at right angles to the multiple bearing surfaces on the tie. It is economically designed giving maximum strength with minimum amount of metal affording a saving of scarce metal in this item of maintenance material.

THE LUNDIE ENGINEERING CORP.
19 WEST 50th ST., NEW YORK — 59 E. VAN BUREN ST., CHICAGO

TRANSPORTATION ESSENTIAL TO VICTORY

● Railroads have a major task in a nation at war. No time now to let rail deteriorate. Save steel, step-up speeds without sacrificing safety by keeping your rail grinders busy. Railway Track-work Grinders are doing their bit for America's leading railroads. Are you fully equipped? Latest data bulletins describe many models.



Railway Track-work Model P-6 track grinder—one of many models.

Railway Track-work Co.

3132-48 East Thompson St., Philadelphia

2170

PRE-FABRICATED

Today, Form-Tys too, come ready to use . . . and the RICHMOND way is the profitable way —better . . . faster . . . less costly.

RICHMOND 10-WAY PROFIT PLAN

1—Over 60 different form-tying devices meeting every condition.
2—Cost less to use than usual "Home-Made" wire, band, or rod tys.
3—Engineered for safe working loads of 1500 to 25000 lbs.
4—Faster erecting and stripping saves time and lumber.
5—Promotes perfect wall alignment, plus uniform thickness.
6—1 to 2 inch "hold back" protects job against rust staining.
7—Wright scientifically cut to save shipping and handling costs.
8—Delivery right to the job saves warehousing. Job section labels save time.
9—No cost for working parts. You pay only for tys used.
10—Job planning bureau specifies types, quantities, methods . . . free.

10 ways to profit!

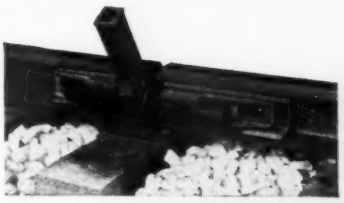
Richmond provides you with form-tying devices and methods specifically engineered for concrete work of every kind—light wall construction or heavy engineering structures. Richmond provides basic advantages definitely superior to anything you may have used. Also, Richmond offers you 10 different ways to profit. See that panel!

THE NAME SNAP-TY IS COPYRIGHTED BY US! *In 1930 — 11 years ago — Richmond, alone, coined and copyrighted the name Snap-Ty as the brand name for one of our tie products.*

RICHMOND SCREW ANCHOR COMPANY, INC.

816 LIBERTY AVENUE, BROOKLYN, N. Y.

Make the Most of Available MAN POWER



One man with a Simplex Rail Puller and Expander takes the place of a rail pounding crew. They eliminate battered rail ends and permit track maintenance with no interruptions in schedules.

They speed lining of crossings and switches, renewing of insulated joints and end posts, and control of expansion and contraction. Push or pull continuous rail lengths.

Three models, all easily applied on outside of rail: No. 550-A, 30-tons capacity; No. 550, 25-tons capacity, applied on web of rail; and No. 555, 15-tons capacity, is applied over ball of rail.

Simplex Rail Pullers and Expanders, Simplex G-Y Tie Spacers and Simplex Electrided Gib Jacks will help you to speed operations and conserve manpower at this crucial time.

Templeton, Kenly & Co.

Chicago, Ill.

· Cutting Maintenance-of-Way Costs Since 1899

SIMPLEX Jacks

Awarded the Gold Medal for Safety

Send For Simplex Bulletin T&B 41

A Floor Patch THAT'S ALL MUSCLE

Don't patch broken concrete floors with "weak-kneed" materials. Use tough, he-man RUGGEDWEAR Resurfacer for patching or resurfacing an entire area. No chopping or chipping required. Merely sweep out spot to be patched—mix the material—trowel it on. Holds solid and tight up to irregular edge of old concrete. Used indoors or out. Dries fast. Low in cost.

Request 74-page "Building Maintenance Handbook"

MAKE THIS TEST!

FLEXROCK COMPANY
2347 Manning St., Philadelphia, Penna.

Please send me complete RUGGEDWEAR information . . details of FREE TRIAL OFFER. No obligation.

Name .....
Company .....
Address .....

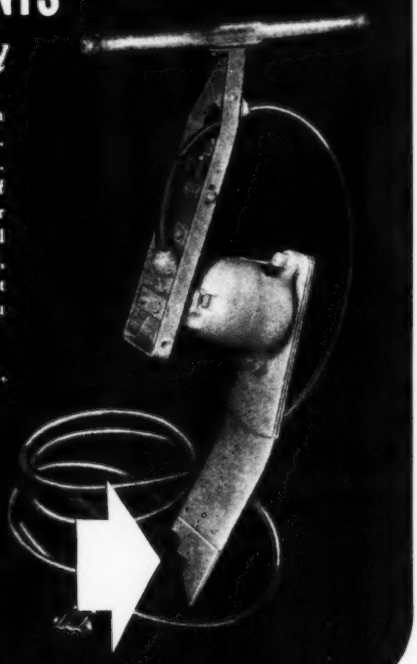
ONE OF THE GREATEST ACHIEVEMENTS

. . . in the track-maintenance field

A more nearly all-purpose tamping blade never has been made. Adapted to all ballasts in any lift of track . . . new ballast insertion, general surfacing, spot tamping . . . the "Step-Cut" blade is acclaimed by the leading roads of the Nation as one of the greatest achievements in tamper history. The special spear-like point penetrates quickly, well under the tie in any kind of ballast — crushed rock, gravel, slag, chatt, cinders, or whatever it may be. And the ballast is not pounded or broken. This tamping blade assures you of smooth riding track that really stays up.

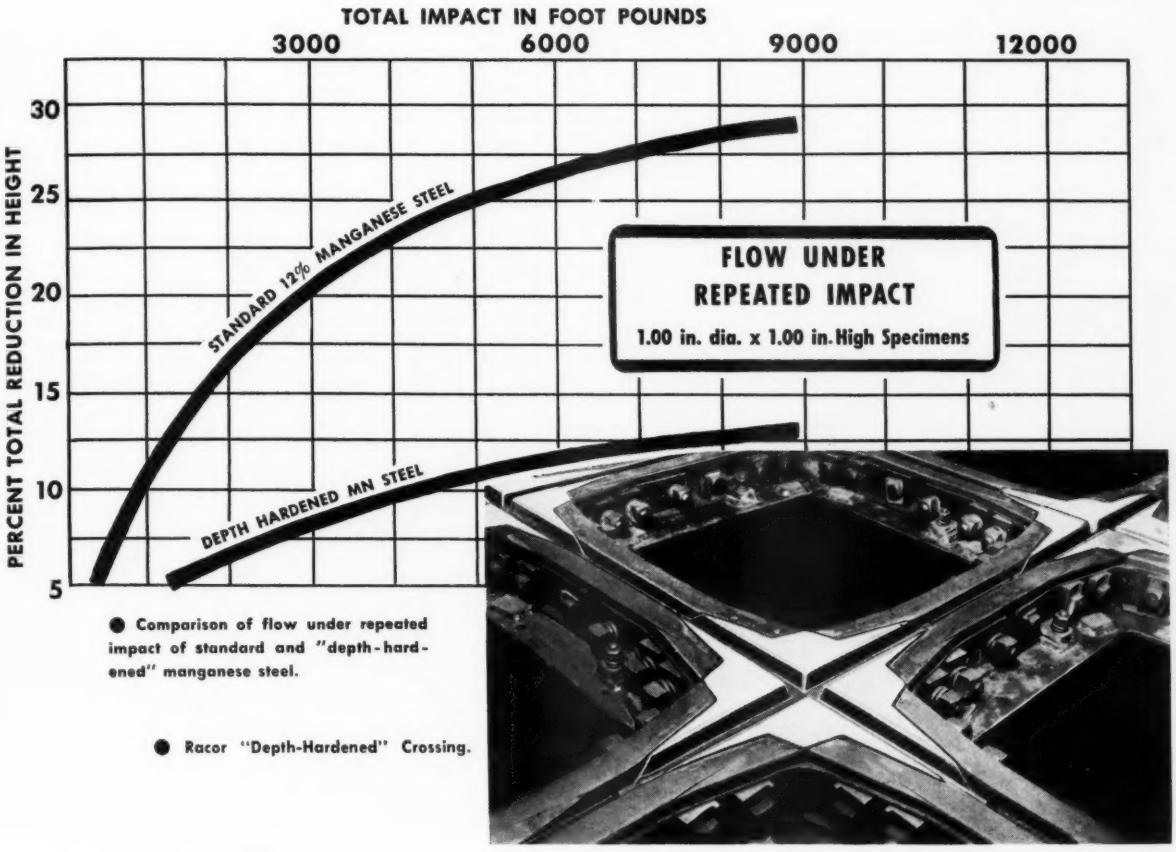
ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICH.

THE JACKSON STEP-CUT TAMPING BLADE



ALPHABETICAL INDEX TO ADVERTISERS

Air Reduction Sales Co. 79
Allis-Chalmers Tractor Division 132
American Brake Shoe & Foundry Co. 131
American Red Cross, The 82
Armco Railroad Sales Co., Inc. 121
Barco Manufacturing Co. 81
Bethlehem Steel Company 69
Buda Co., The 124
Butler Manufacturing Company 126
Chicago Pneumatic Tool Company 78
Cullen-Friestedt Co. 124
Douglas Fir Plywood Association 75
Eaton Manufacturing Company 68
Electric Tamper Equipment Co. 130
Fairmont Railway Motors, Inc. 77
Flexrock Company 129
Industrial Brownhoist 127
Koppers Company 71
Lufkin Rule Co., The 128
Lundie Engineering Corp. 128
Mall Tool Company 128
National Lock Washer Company, The 67
Nordberg Mfg. Co. 88
Oxweld Railroad Service Company, The 83
Railroad Accessories Corporation 86
Railway Maintenance Corp. 76
Railway Track-work Co. 129
Ramapo Ajax Division 131
Reliance Spring Washer Division 68
Richmond Screw Anchor Company, Inc. 129
Ross and White Company 127
Simmons-Boardman Publ. Corp. 80-128
Sperry Rail Service 74
Templeton, Kenly & Co. 129
Timber Engineering Co., Inc. 85
Timken Roller Bearing Company, The 73
Union Carbide and Carbon Corporation 83
Union Metal Manufacturing Co., The 125
Warren Tool Corporation 72
Williams & Co., J. H. 126
Wood Preserving Division 71
Woodings Forge and Tool Company 70
Woodings-Verona Tool Works 70
Woolrey Machine Company 123
Young & Greenawalt 125



● Comparison of flow under repeated impact of standard and "depth-hardened" manganese steel.

● Racor "Depth-Hardened" Crossing.

RACOR

"Depth Hardened" Crossings LAST LONGER with LESS MAINTENANCE

Made from manganese steel of special composition in accordance with an improved design and pre-hardened by hammering before installation, the receiving surfaces of these new Racor Crossings will stand harder use with less flow of metal into flangeways.

Results from the use of Depth-Hardened Crossings prove that train vibration is greatly reduced and maintenance cost lessened.

Write for full details

RACOR **RAMAPO AJAX DIVISION**

THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

STREAMLINED SERVICE

. . . ON "OFF THE TRACK" MAINTENANCE

Above: This Model HD-7 tractor (60 drawbar h.p.), and Gar Wood, 2-wheel scraper, owned by the Chicago, Burlington and Quincy R.R., builds up the road bed and widens right-of-way for the crack Burlington Zephyr. Note bulldozer on front of tractor — used to push dirt up slope and level it after being dumped. Both ends of the HD-7 work!

TRACTOR-SHOVEL. No end to the uses of this Hough shovel and Allis-Chalmers Model WM (gas) tractor. Digs, carries, loads or dumps solid dirt, clay, gravel or crushed stone. Ideal for "off the track" maintenance or in the yard. Easily transported from one job to another on its own transport wheels, by trailer, on railway car or in body of truck.

You "stepped out" on the tracks with speedy streamliners . . . now many of you are also "stepping out" off the tracks . . . on maintenance. Road-beds and drainage ditches are put into shape faster, at less cost with modern 2-cycle Diesel tractors. Powerful, smooth-operating, the 2-cycle engine purrs quietly in toughest going — "hangs on" . . . like steam power! Operator opens the throttle instead of shifting gears. Picks up speed in a flash. Teamed with a 2-wheel scraper, the 2-cycle Diesel tractor swings around with load in high . . . end-dumps material exactly where wanted — up or over the slope, around bridges, culverts and other tight spots. Clicks every second! You save time and money on greasing, too! One supply of lubricant lasts 200 hours in the Positive-Seal truck wheels and idlers — eliminates ½ hour greasing period every shift. Investigate this modern maintenance method!

Write for catalog.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U. S. A.
2-CYCLE DIESEL POWER
3 SIZES — HD-7, HD-10, HD-14. 60 to 132 DRAWBAR H.P.